The Monthly Review of the AMERICAN ELECTROPLATERS' SOCIETY

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OCTOBER 1939

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The Monthly Review

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A Society for the Advancement of the Science of Electroplating

OCTOBER 1939

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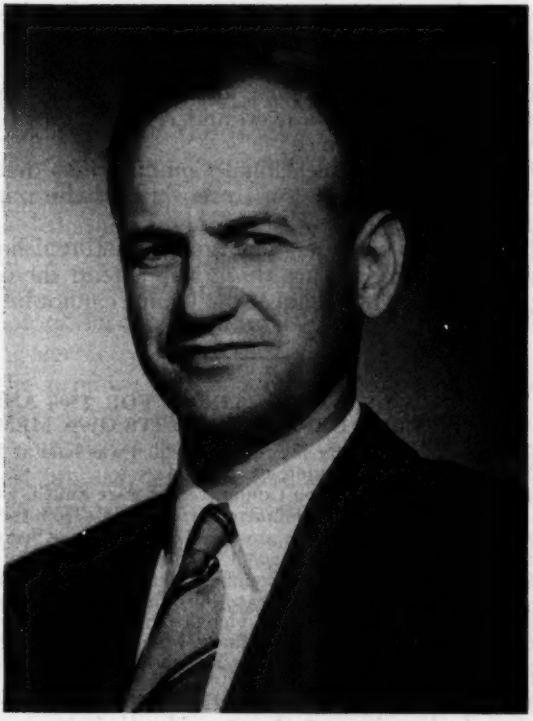
1940 Convention



H. C. LUECHAUER
Chairman of the Educational Committee of the Dayton Convention

With the last National Convention only a few months past, the Dayton Branch is rapidly formulating its plans for the next year's convention. Various committees have progressed to the point, where only the smoothing out of a few of the minor details remain between them and a completed program.

At the present, it is too early to announce a complete list of the papers to be given at this convention. To date a tentative program has been outlined to include every phase of electroplating, from the preparation of the surface of the base metal to the final operation as a finished product.

In order to attract the closer attention of the audience to the papers being presented at this convention, the Educational Committee has decided to ask the authors of the papers to demonstrate them wherever possible. It is the opinion of the committee that a demonstration in conjunction with the lecture tends toward a more complete understanding of the subject matter being presented.

The branch has decided to limit the educational sessions to four papers each or twenty-four papers for the entire convention. With the number of papers being held to a minimum, it is the aim of the branch to give to the last author as well as to the first, an audience who will not be tired and restless from listening to too many papers at one time.

It is the plan of the Educational Committee to distribute, at the close of the evening sessions, preprints of the papers to be presented the following day.

With the promises of papers from many distinguished authors the Dayton Branch can assure those who attend the convention next year, a program whose educational value cannot be estimated in dollars and cents.

NEWARK PRESENTS US WITH A CHECK FOR $500 AND ENTERTAINS THE SUPREME OFFICERS AND ITS OWN MEMBERS

Nearly 100 were present at the above party which was held at Moose Hall, Irvington, N. J. on Saturday evening, October 14.

Chairman of the 1939 Convention Committee, Horace Smith, welcomed the guests. Mr. Smith stated that the committee's total profits from the convention was a little more than $1300. He then presented the Executive Secretary with a check for $500 to be used for the benefit of the membership of the A.E.S. President Ray Goodsell thanked the members of the Branch for the gift and spoke briefly on Newark Branch's loyalty to the officers of the Supreme Society. First vice president Fulforth and Third vice president Nelson Sievering were also present. The other speakers introduced were Ralph Liguori and F. J. MacStoker, president and secretary of New York branch and Mr. John Kotches president of Newark branch.

A charming gesture on the part of the Ladies Auxiliary of Newark branch was the presentation of a large bouquet of roses to Mrs. Hodecker on the occasion of her 36th wedding anniversary. Arm in arm Mr. and Mrs. Hodecker stood in the center of the room while Mrs. Horace Smith, president of the ladies society made the presentation. The orchestra in the meantime played the wedding march. Mr. Philip Sievering congratulated Mr. and Mrs. Hodecker in a few well chosen words on behalf of the branch.

After this event the members sat down to as good a lunch as anyone could possibly desire. There was a floor show and dancing both of which were very much enjoyed. Newark branch members are extremely proud of the women's part in the success of the Asbury Park convention and told them so in no uncertain terms during the evening's entertainment.

Current Density Range Characteristics - *Their* Determination *and* Application

R. O. HULL[1]

Paper presented before the American Electroplaters' Society Convention — June 19-22, 1939, Asbury Park, New Jersey.

ONE of the most important tasks that perpetually confront electroplaters is maintenance of plating solutions to insure continuous production of satisfactory deposits. For this purpose, scientific control methods, including direct methods of chemical analysis and indirect methods of physical measurements, such as surface tension for surface active materials, have gained ground rapidly during the past few years and are now quite indispensable. However, these methods are frequently not applicable to determination of small concentrations of highly effective organic addition agents or of impurities that make marked changes in the character of deposit, and in such cases, it has usually been necessary to rely upon experience and occasional examination of deposits to establish whether or not a solution is functioning correctly.

Since the primary function of any electroplating solution is production of good quality deposits, whether they be bright or dull, it is apparent that the use of a simple, reproducible plating test is very desirable and in many cases is essential to supplement abstract control methods. Obviously, if a solution gives good deposits in a plating test, it must continue to do so for an appreciable period of time, barring accident. It is therefore possible to secure absolute assurance of continued good solution operation by making routine plating tests at sufficiently frequent intervals so that no marked change can take place in solution concentration or characteristics in the intervals between tests. It is also highly desirable to make plating tests, using a small volume of solution, before and after any contemplated addition to the solution, especially of addition agents, to insure that the addition will produce the desired result with no harm to the solution.

The most serious limitation to the use of plating tests in the past has been the tests themselves. By this is meant lack of reproducibility of test conditions by which trends in changes

(1) Research Chemist, General Research Section, E. I. du Pont de Nemours & Company, Grasselli Chemicals Department, Cleveland, Ohio.

of character of deposit could be observed from time to time. Thus, to secure an accurate picture of such trends, deposits would have to be made at a number of current densities, since the character of deposit is largely dependent upon the current density used. This has been recognized and efforts have been made to secure fairly wide bands of current densities on one cathode by using recessed, U-shaped, or bent cathodes, but such tests are not sufficiently reproducible to serve as an accurate check upon solution behavior and, in particular, do not lend themselves to accurate determination of optimum or bright current density range.

The present paper describes a simple method ([2]) for making plating tests of solutions by which a single, flat cathode records reproducibility the character of deposit produced at all current densities within the entire operating range, and by measurement of distance of bright or otherwise satisfactory deposits from the end of the cathode plate, the most suitable current density range can be calculated or determined from a curve. The reproducibility is such that optimum addition agent concentrations can be established, and trends can be followed in changes of character of deposit with solution operation. The method has been used in the laboratory, as well as in commercial plants, and has proved of value in greatly reducing the time required for plating tests. For convenience, the present paper is divided into two subsequent parts, the first describing the principle and practical operation of the method, and the second describing the method for determining the current density distribution on the cathode plate.

II. PRINCIPLE AND APPLICATION

The necessity for imposing variations in current density on a single cathode has been recognized by W. L. Pinner and E. M. Baker ([3]) and Oliver J. Sizelove ([4]). By means of the bent cathodes there described, variations in current density were obtained, but at no known rate or distribution. Such variations depended largely upon the shape of the cathode and the normal current distribution resulting from a number of indeterminate shielding effects of one part upon another and were therefore lacking in definition and reproducibility.

(2) U. S. Patent 2,149,344. Application March 22, 1935, issued March 7, 1939.
(3) Trans. Electrochemical Soc. 55, 315 (1929).
(4) Monthly Rev. Am. Electroplaters' Society, Apr. 1929.

The principle of the present method for determining current density ranges by securing deposits simultaneously at all normal current densities depends upon placing a flat cathode with respect to a plane, non-conducting surface, preferably the side of a plating cell as shown in Figure I. An arrangement similar to this was mentioned by Busse([5]), who was concerned chiefly with change in potential with anode to cathode distance, and by Kasper([6]) who stated that in such a cell, a quantitative statement of the current distribution over the inclined cathode was possible and had been worked out. Kasper's mathematical derivation[7] is readily applied to cases in which the walls or cell sides are electrodes but is more difficult of application to the present cell and furthermore, must be modified to include secondary polarization effects upon current distribution. For these reasons, it was believed most expedient to determine experimentally the current distribution along the cathode plate followed by development of a simplified formula or equation for the experimental curves as given under III.

The effect of placing a flat cathode in a cell as shown in Figure I

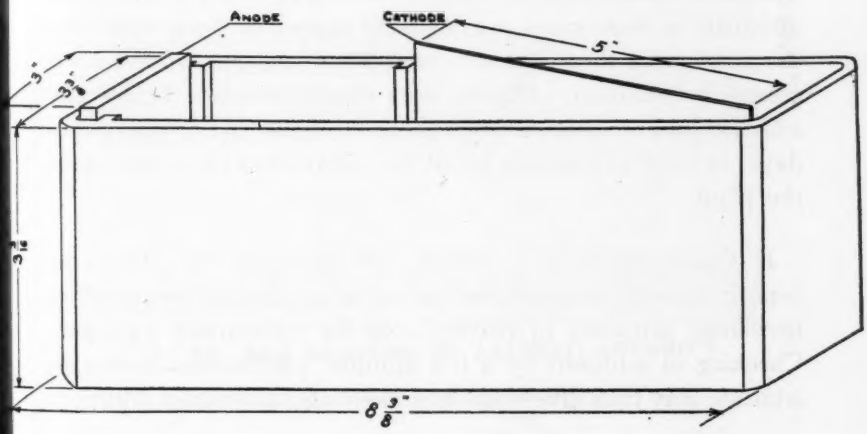


FIG I PLATING TEST CELL

(5) Zeitschrift für Electrochemie, 38, 784 (1932).
(6) Proc. Am. Electroplaters' Society, 25 (1938).
(7) Private Communication.

is to allow free flow of current to one end of the cathode, while restricting the flow to the other end by continuously narrowing the cross-sectional area through which the current flows. The dimensions of the cell, the cathode plate and its angle with the cell wall determine the range of current density covered. As a result of experiment and consideration of practical use, a standard size was selected having the dimensions shown in Figure I and having a capacity of one quart (or one liter), together with a cathode 5 by 3 inches (submerged area, 5 x 2-1/2 inches) requiring a current of either 3 or 5 amperes and a potential up to 18 volts. Under these conditions, the entire operating current density range of any plating solution is included in one cathode deposit. Conversion of additions to the cell are readily made to plating tank sizes.

The procedure in using the cell for making plating tests is to measure in the clean cell one quart or one liter of solution, bring to correct operating temperature and plate the cathode (properly cleaned) at the current desired for the required length of time. The anode usually can fill the cross section as shown in the figure, although in some cases, e.g. cyanide copper or brass solutions, the anode area should be increased by corrugating, to avoid excessive polarization. Plating tests should be made before any addition and at sufficiently frequent intervals (every one or two days) to keep an accurate log of the behavior of each solution in the plant.

It is advisable to use a cathode only once and not to strip the deposit, in order to avoid residual metal on the surface as well as to permit retention of plating tests for comparison purposes. Checking of solutions by a few minutes' plating test before an addition may thus save hours in remedying an incorrect addition.

In general, two kinds of polished cathodes 5 by 3 inches, copper and cold rolled steel, answer all requirements for the different solutions. The time of plating is an important factor and varies with the different solutions. As a result of considerable experience, the preferred current, cathode material and plating time have been established as given in Table No. I.

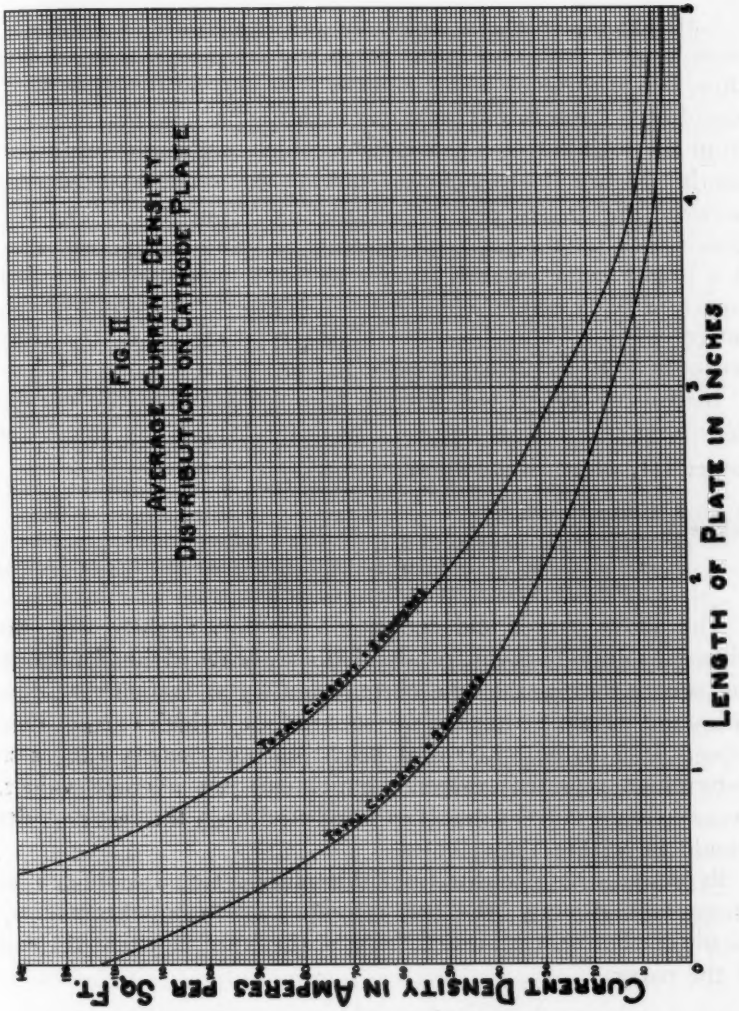


FIG. II
AVERAGE CURRENT DENSITY
DISTRIBUTION ON CATHODE PLATE
LENGTH OF PLATE IN INCHES
CURRENT DENSITY IN AMPERES PER SQ. FT.

TABLE NO. 1 — Conditions for Plating Tests

Solution	*Total Current Amps.*	*Total Plating Time in Minutes*	*Preferred Cathode Metal*
Acid Copper	5	10-15	Copper
Cadmium	5	2- 3	Steel
Cyanide Zinc	5	2- 3	Copper
Acid Zinc	5	10-15	Copper
Chromium	5	2-10	Copper
Nickel (Grey or Bright)	3	10-15	Copper
Cyanide Copper	3	10-15	Steel
Silver	3	10-15	Copper
Brass	3	10-15	Steel
Tin	3	10-15	Steel

Cathode plates made under the above conditions invariably show bright, dull, and burnt areas and frequently two or even three bright areas on a single plate. The current densities corresponding to these bright areas can be determined by measurement from the high current density end, which is the end nearer the anode. Figure II gives curves showing the average relationship between the current density and distance from the high current density end for the two total currents of 5 and 3 amperes. Thus if a bright range extends from 2 to 3-1/2 inches from the high current density end at 5 amperes total current, the bright plating range is from 51 to 17 amp./ft.^{2} (or reversing it in the usual parlance from 17 to 51 amp./ft.^{2}).

Instead of the curves, a close approximation to the current density at any point is expressed by a simple equation, developed under III, which is as follows:

$$A = C(18.8 - 28.3 \log L)$$

Where A = current density in amp./ft.^{2} at any point.
C = total current (5 or 3 amps.).
L = distance in inches from the high current density end of plate of point corresponding to A.

The above curves and equation vary only slightly with the different solutions, giving results that are always within 5 amperes per square foot of the true current density at low current densities and within 8 amperes per square foot at high current densities. It is to be noted that bright current density ranges so determined represent extreme limits and not average values, hence average current densities to be used from the test deposits should be within these limits.

Representative deposits from this plating test are difficult to photograph directly, the best reproduction being obtained by means of photostat copies. Several of these are shown at the end of the paper.

III. CURRENT DISTRIBUTION ON THE CATHODE PLATE

The concept of current distribution in electroplating has been discussed by Haring and Blum([8]) in terms of primary current distribution, determined by simple distance relationships, and secondary current distribution, determined by composition and electrochemical properties of solution. These, together with the change in metal current efficiency with current density, establish

(8) Trans. Amer. Electrochemical Society, **44**, 313 (1923).

the actual metal distribution in a given case. Mathematical calculations of throwing power were made by Haring and Blum for a simple cell and verified by experiment, and these have been greatly extended by Kasper (loc cit and(9)) to the more simple conductors.

In the present instance, the primary current distribution was found experimentally by using an acid copper sulfate solution, which is characterized by low throwing power and polarization, and comparisons were made with nickel, cadmium and zinc plating solutions by stripping and weighing small sections of the deposits each 1/2 by 1-1/4 inches. The effective current density, or that utilized for production of the metal deposit, was then calculated for each metal and plotted as in Figure III. From these curves, the manner in which throwing power affects distribution is quite apparent, since the curves for cyanide cadmium and zinc which have high throwing power are quite flat as compared with the acid copper and nickel solutions having low throwing power, verifying that the effective current density or metal distribution is more uniform in the case of the cyanide solutions than the usual non-cyanide solutions.

Figure III illustrates only the effective current density and gives no indication of the primary current distribution except for acid copper, in which the metal distribution and primary current distribution are always closely coincident and secondary polarization effects are very small. This is not characteristic of the other solutions, particularly cyanide solutions, in which differences in polarization at different current densities might be expected to change the current distribution over the cathode plate.

The actual current density distribution or secondary current distribution, is the most important consideration, if the test is to be used for determining current densities over the plate area by measuring the distance of the desired bright or dull areas from the end of the plate. To determine the secondary current distribution for the various solutions a modified current density meter was used as in Figure IV. A small copper strip (A), 1/2 by 2-1/2 inches was used (submerged area) to the back of which a rubber strip was cemented. The copper strip was electrically connected to the main cathode plate through the variable resistance (R), milliammeter (M), and cell (C), and a potentiometer (P) was

(9) Monthly Rev. Am. Electroplaters' Society, Feb. 1939.

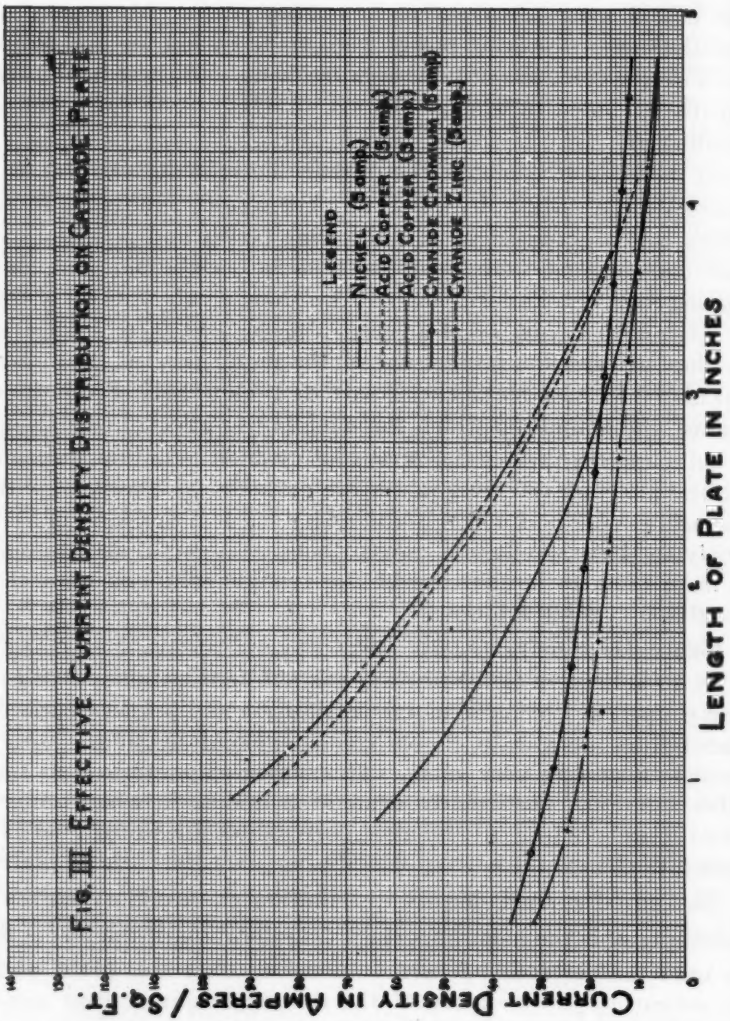


Fig. III Effective Current Density Distribution on Cathode Plate
Legend
Nickel (5 amp.)
Acid Copper (5 amp.)
Acid Copper (3 amp.)
Cyanide Cadmium (5 amp.)
Cyanide Zinc (5 amp.)
Length of Plate in Inches
Current Density in Amperes / Sq. Ft.

placed in a separate circuit between the cathode plate and strip. The potential, as measured by (P), between the cathode plate and strip, was maintained at zero by adjusting (R) and the current in amperes passing to the strip was determined from the milliammeter (M). This current, supplied by cell (C), was the amount required to maintain equal potentials on the strip and the cathode plate. It was therefore a measure of the current density on the

strip; just as if the strip were in a separate circuit maintained at the same potential as the cathode. Current readings in milliamperes from (M) were obtained by moving the copper strip over the cathode surface, insuring nearly complete blocking out of current back of the strip by intimate contact of the rubber back with the cathode plate.

Figure V shows the results of the current density measurements as made above for all the solutions tested, the upper curves for 5 amperes and the two lower curves for 3 amperes total current. These are of particular interest in that they show that the secondary current distribution is quite independent of the type of solution tested. Hence an average curve can be derived from which the approximate current density at any point can be determined irrespective of the type of solution under test.

Comparison of Figures V and VI shows that the current density readings from the current density meter were always greater than the true current, as determined from copper thickness measurements. Since the summation of errors was undoubtedly due to the experimental method in using the separate strip, the true or corrected secondary current distribution was determined for each solution by applying the proper correction factor (from acid

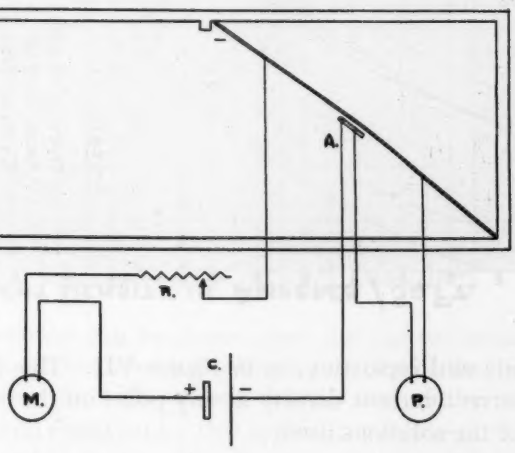
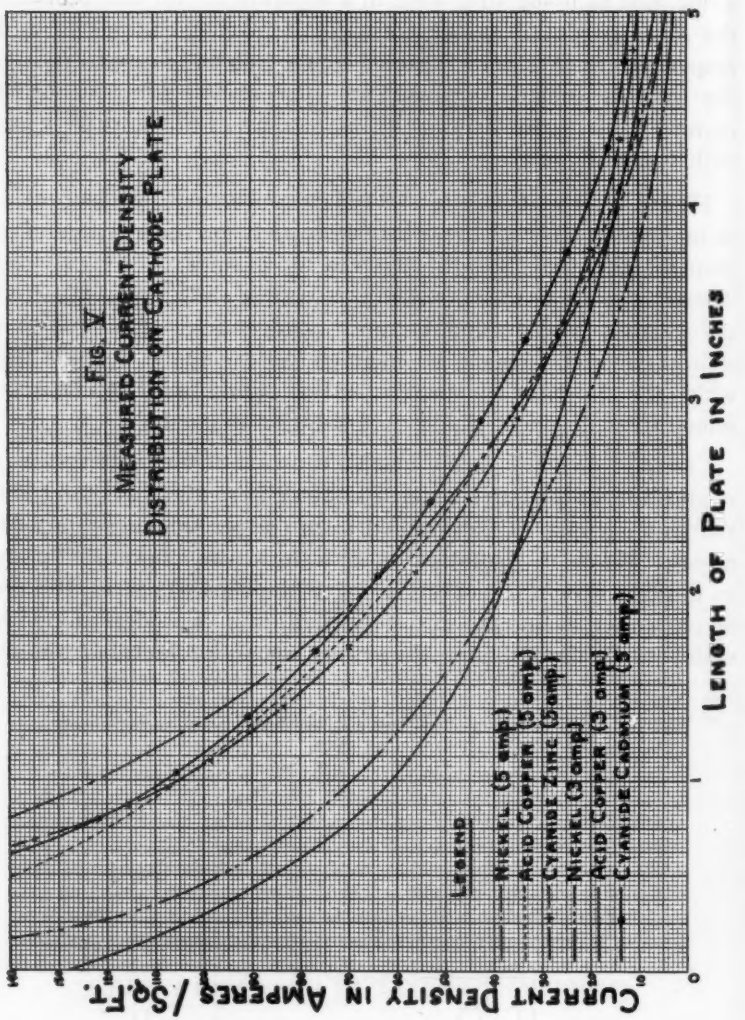


FIG. IV MODIFIED CURRENT DENSITY METER DIAGRAM



copper) and replotting, as in Figure VII. This figure then gave the correct current density at any point on the cathode plate for any of the solutions used.

The point of perhaps greatest interest was that found by transferring Figure VII to semi-log paper, as in Figure VIII. In this, it is significant that all of the curves become straight lines, from

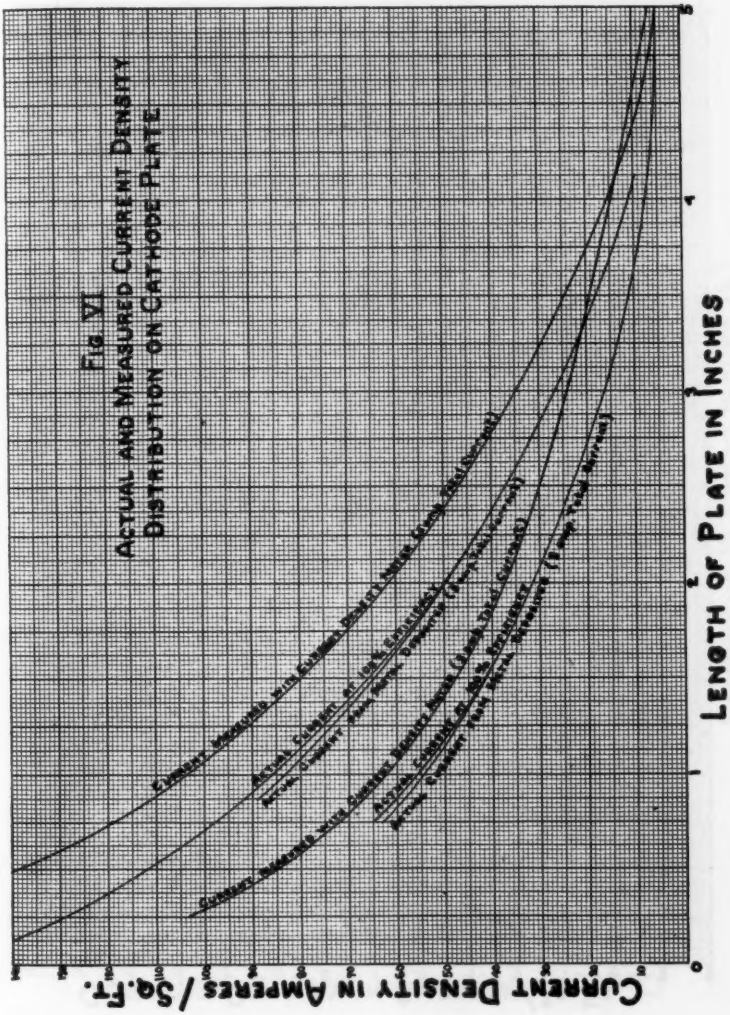
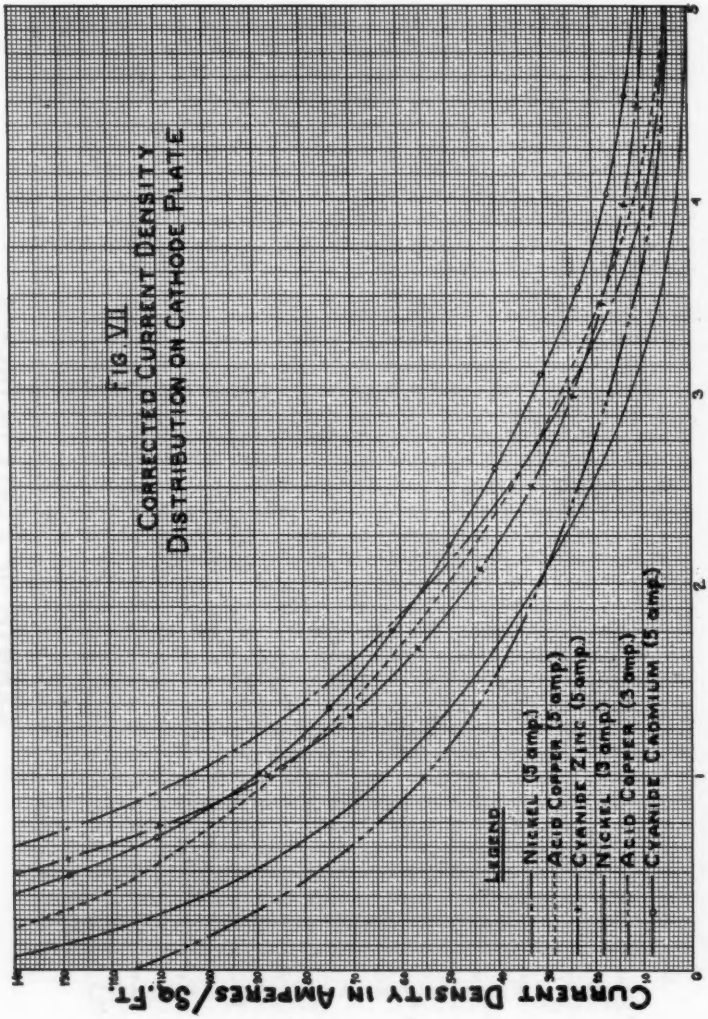


Fig. VI
Actual and Measured Current Density Distribution on Cathode Plate
Length of Plate in Inches
Current Density in Amperes / Sq. Ft.

which the conclusion can be drawn that the current density at any point on the cathode is a logarithmic function of the distance of the point from the high current density end of the cathode plate. The general equation for this type of curve is—

$A = K_1 - K_2 \log L$

Where A = current density at any point.
L = distance of the point from the high current density end of plate
K_1 and K_2 = constants.

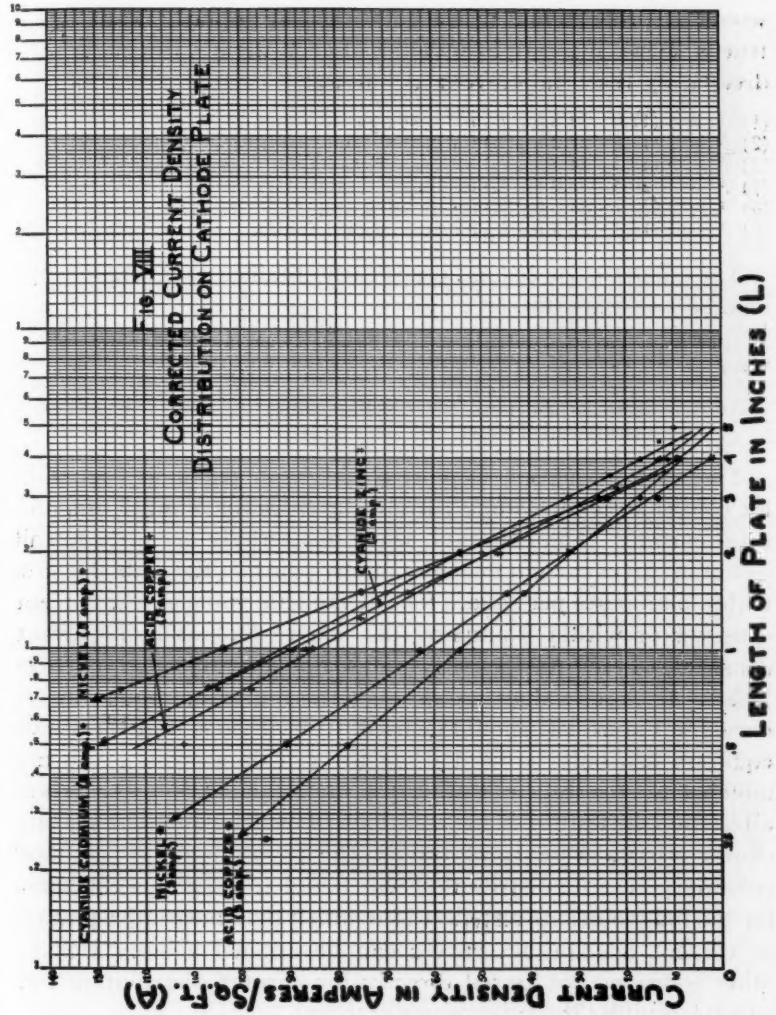


As an example of the calculation of the equation for each solution, we may take the 5 ampere copper curve. From this—

Where $L_1 = 1$ or $\log L_1 = 0$; $A_1 = 85$
$L_2 = 3$ or $\log L_2 = .477$; $A_2 = 26$

$$M = \text{tangent of angle of inclination} = \frac{85 - 26}{0 - .477} = -124$$

The general equation—



$A = A_1 + M \log L$, where A_1 is the y intercept becomes -

(1) $A = 85 - 124 \log L$ for acid copper, 5 amp.

Similarly, equations for other curves were derived as follows:

(2) $A = 89 - 136 \log L$ for cyanide zinc, 5 amp.
(3) $A = 91 - 124 \log L$ for cyanide cadmium, 5 amp.
(4) $A = 104 - 165 \log L$ for nickel, 5 amp.
(5) $A = 62 - 101 \log L$ for nickel, 3 amp.
(6) $A = 55 - 79 \log L$ for acid copper, 3 amp.

It might be expected that the current density at any point

would be proportional to the total current applied. That this is true is shown if the right member of each the above equations is divided by the total current as follows:

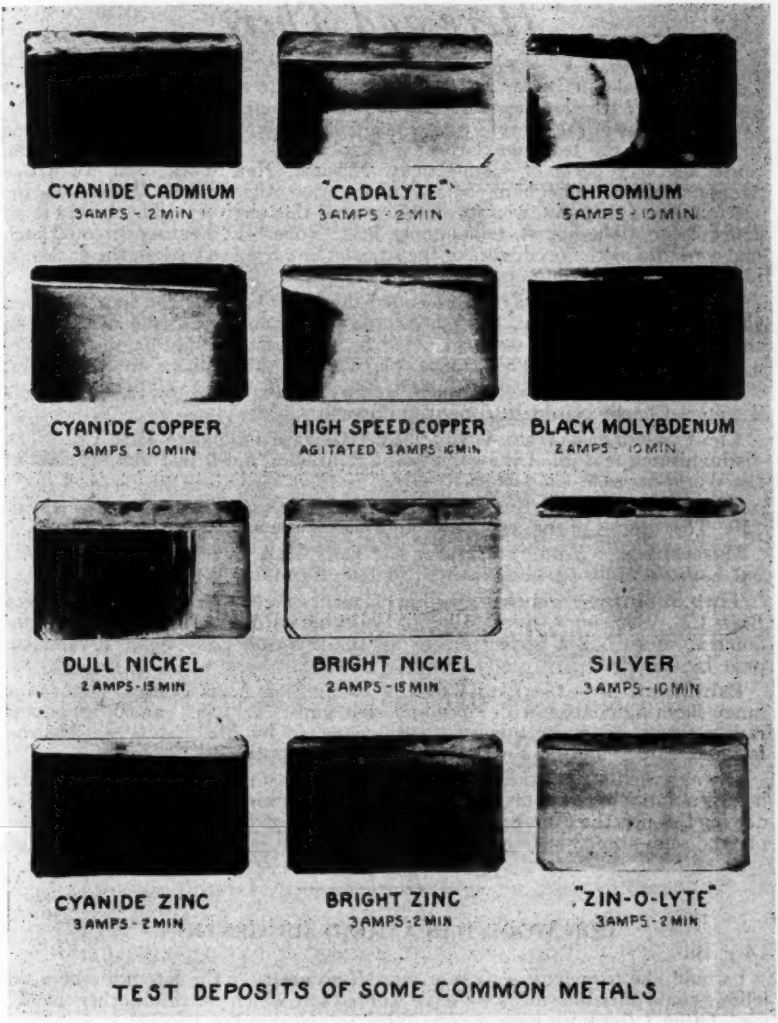
(1) A = 5 (17.0 - 24.8 log L) for acid copper, 5 amp.
(2) A = 5 (17.8 - 27.2 log L) for cyanide zinc, 5 amp.
(3) A = 5 (18.2 - 24.8 log L) for cyanide cadmium, 5 amp.
(4) A = 5 (20.8 - 33.0 log L) for nickel, 5 amp.
(5) A = 3 (20.7 - 33.6 log L) for nickel, 3 amp.
(6) A = 3 (18.3 - 26.3 log L) for acid copper, 3 amp.

The equation for general use is then obtained by averaging the members in parentheses to give—

$A = C (18.8 - 28.3 \log L)$
Where A = current density in amps./ft².
C = total current in amperes.
L = distance in inches of point corresponding to A from the high current density end of plate.

The above equation is plotted on graph paper in Figure II for convenience in reading current densities for 5 and 3 amperes total current. The equation, while not strictly accurate for all solutions, gives current densities at any point on the cathode plate within 5 amperes per square foot of the true value at low current densities or within 8 amperes per square foot at high current densities, where total currents are used as recommended in Table No. I. If closer values are desired, the individual equations or curves in Figure VII should be used. It is obvious that the above equation can only be used when the cell dimensions given are adhered to strictly, since other cell and cathode dimensions will alter the constants. Since solutions of widely different plating characteristics were employed in the experimental work, and secondary current distribution was found to be about the same for the four solutions tested, it is assumed that the same equation or current distribution curves can be applied equally well to other solutions not tested directly for current distribution but which fall under the types actually tested.

In conclusion, it is believed that the consistent use of a simple, accurate and adequate plating test, such as described herein, for determination of current density ranges and characteristics of deposit will afford a positive check of effects of addition agents or of impurities upon deposits together with a more positive assurance of proper solution operation than has heretofore been possible. It is hoped that this test will prove of benefit in re-



TEST DEPOSITS OF SOME COMMON METALS

moving some of the doubts so frequently attending the operation of plating solutions and will prove of value in supplementing other methods of solution control.

The writer wishes to acknowledge the assistance of Mr. C. F. Ruebensaal who made most of the measurements and prepared the experimental data.

Here and There

Whenever that semi-annual classic, known as "Bob Leather's Party" at Leacrest is held, it is particularly noticeable that the weather man always cooperates. With cloudless skies and warm sunshine and with just an exhilarating coolness in the air that makes one's whole being tingle, the boys started to gather for the feast on Saturday, October 7. They came from Boston, Springfield, all parts of Connecticut, Newark, New York, and we had a member from Birmingham, Mich., none other than Dave Willard of the Detroit Rex Company, who formerly covered this territory. There were in all 180 present. The genial, unassuming host, Robert E. Leather, greeted each one cordially as the occupants of the various cars tried to park in the enclosure in front of the club house.

After refreshments, the crowd wended their way to enjoy the sports of their choice, baseball, archery, horseshoes, and trap shooting. Some preferred to talk shop, while others were attracted by the indoor proceedings, the poker game predominating. The games played and the winners are as follows:

Baseball — Platers vs. Salesmen, won by the Platers, 8 to 5, Capt. Platers Team — Charlie Nardozzi, American Fastener Co.

Capt. Salesmen's Team — Bill Dehle, Colgate Palmolive Peet Co. The distinguishing feature of the game was a whirlwind finish just like the final of the World Series at Cincinnati.

Archery — Won by R. J. Crane, (Dick Crane's brother). Score 87 out of 150. This is a lot of fun, especially hunting for the arrows in the long grass.

Horseshoes — Won by A. Huber and Tony Maz. Seven games were played but Huber and his partners easily defeated all comers.

Trap Shooting — in charge of Earl Couch, won by Gray Somers of Somers Brass Co., Waterbury. Jack Miller of Waterbury Rolling Mills tied with Gray Somers. Both had a perfect score. In the shoot-off Gray Somers won first prize by one bird.

Exhibition Shoot — Gail Evans of Remington Arms Company staged a fancy shooting contest with rifles and shot guns. Tin cans, cans of tomatoes, raw potatoes and over ripe eggs were peppered by Mr. Evans in excellent fashion. Mr. Evans did a neat job and was well applauded.

It was a well attended and very successful party from start to finish. The beautiful fall foliage at this season of the year was very much enjoyed by those driving through the Connecticut hills for the frolic and lends added charm to the platers' semi-annual outings at Leacrest.

DON WOOD HAS A GOOD SUGGESTION

Dear Bill:

I would like to suggest a page or more if necessary in the REVIEW where we fellows could offer *little* ideas we have worked out which we think others might use. Often I think we have a good thing to mention but because it wouldn't write into more than a paragraph we keep it to ourselves. For instance, you couldn't make a story of it but *Sodium or Potassium Nitrate plus a little Ammonium Hydroxide makes a much better strip for silver from steel than cyanide. You use it electrolytically about 2-3 lbs./gal. of the nitrate and add the ammonia from time to time to keep the solution clear.*

You see what I mean — I bet lots of fellows could write that much. DON.

WING YOUR WAY TO DAYTON, THE BIRTHPLACE OF AVIATION

Determination *of* Thickness *of* Electrodeposited Chromium

M. M. BECKWITH[1]

Development Engineer, The J. B. Ford Sales Co., Wyandotte, Michigan

THE stress placed on electroplating metals to thickness specifications has created a necessity for methods of testing the thickness of the deposit. Many methods have been presented which cover the different metallic coatings. These methods vary in accordance with the metal to be tested and the accuracy required of the test.

The average thickness over a given area can be evaluated by stripping the metallic coating and determining the weight of the metal by chemical methods. The thickness is then calculated by using the value of the density of the metal. This procedure is quite accurate, but is tedious and time consuming. In general, this procedure is not applicable to routine testing for control of thickness to meet specifications because the number of checks that can be made in a day's time is limited to a very few.

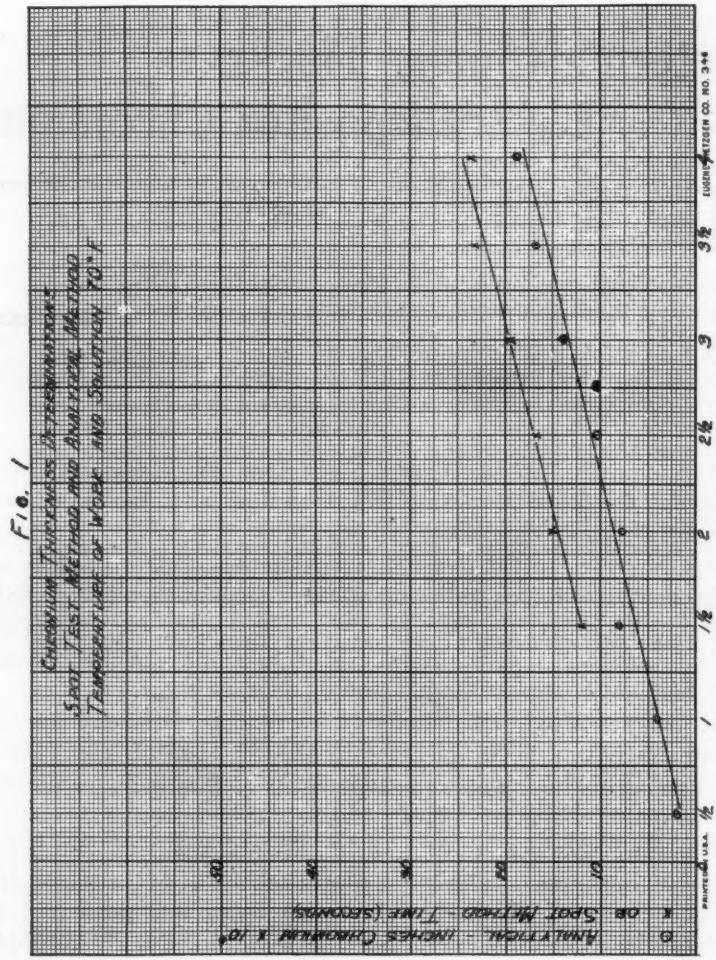
Metals deposited to a thickness of .0001 inches or more can be conveniently and accurately checked by the use of microscope equipped with Filar micrometer eyepiece. This includes nickel and copper and heavier deposits of zinc, cadmium and tin.

The Hull-Strausser drop test for the thickness of zinc and cadmium has proved valuable in routine checking of these metals.

The testing of electrodeposited chromium has presented a problem because the deposit is relatively thin, usually .000010 inches to .000050 inches and frequently even less. This order of magnitude is too small to check with the microscope in common use in the routine laboratories of the plating industries.

W. L. Pinner[2] and L. B. Sperry[2] presented some very good data before the American Electroplaters New York Convention in 1937, showing that the drop method for chromium thickness

1. Development Engineer, The J. B. Ford Sales Company, Wyandotte, Michigan. The work on this paper was done while the author was with Guide Lamp Division, General Motors Corporation, Anderson, Indiana.
2. Pinner and Sperry, *The Monthly Review*, 340, May, 1938.



determination as proposed by C. Heussner was valid and could be used as a routine method. The test is made by putting a drop of hydrochloric acid on the chromium plate and measuring the time of gas evolution from the first bubble to the exposure of the underlying nickel plate. The curves in their paper show that the temperature at which the test is made has a great influence on the rate of attack of hydrochloric acid on chromium and, therefore, a factor must be used to change the time, in seconds,

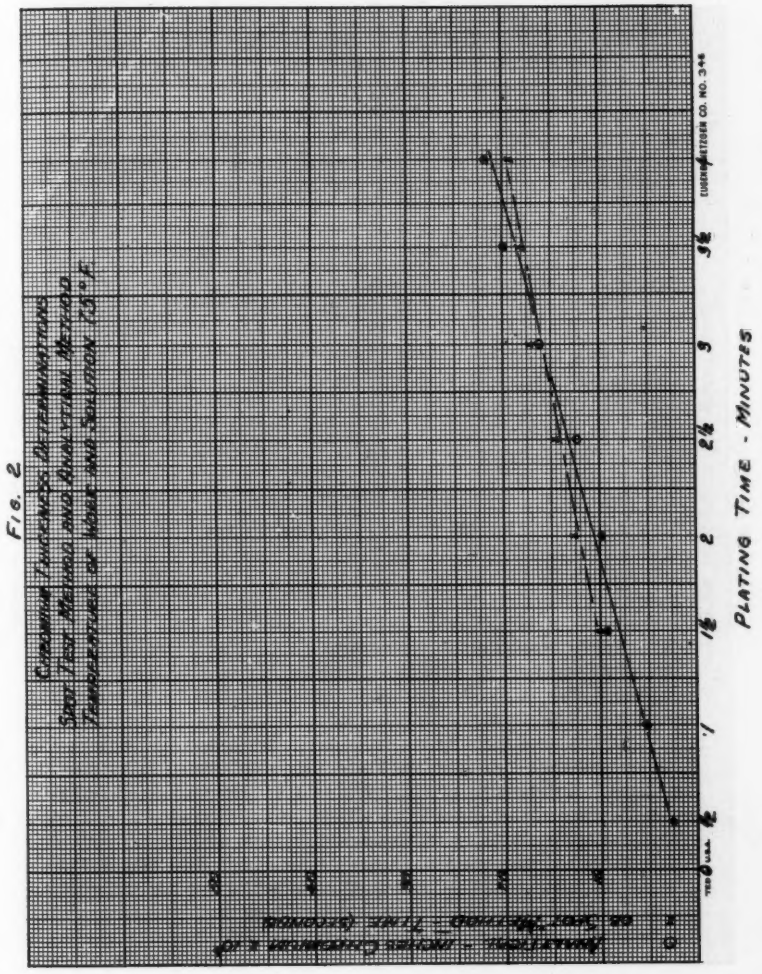


FIG. 2

of the evolution of gas to the amount of chromium dissolved.

The determination of the time of action of the acid presents a series of difficulties. The appearance of the first bubble and the time of finishing the count of elapsed time are factors which are dependent on the observer and his experience with the test.

S. G. Clarke[3] has proposed a solution to be used for the testing

3. Clarke, S. G., *The Monthly Review*, 712, September, 1938

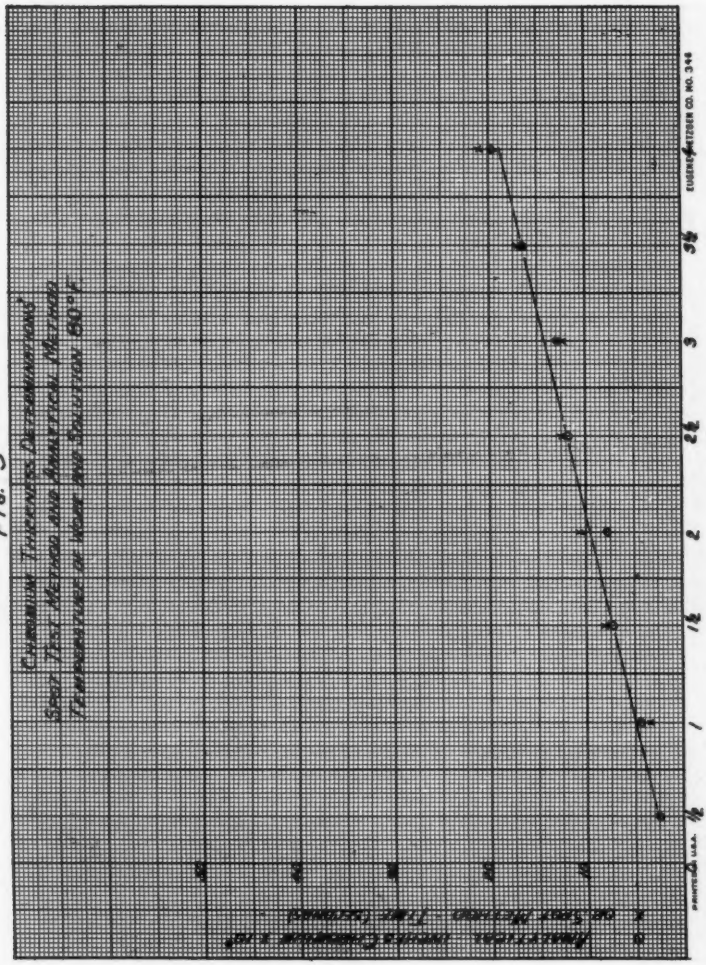


FIG. 3
Chromium Thickness Determinations
Spot Test Method and Jellinek Method
Temperature of Hot Solution 60°C
PLATING TIME - MINUTES

of the thickness of the chromium deposits by measuring the time of gas evolution.

The method given by S. G. Clarke uses a solution of hydrochloric acid with a specific gravity of 1.16 and containing 20 grams per liter Sb_2O_3 (Antimony Oxide). According to him, the specimen can be immersed in the reagent or the reagent can be placed in a ring glued to the surface of the specimen.

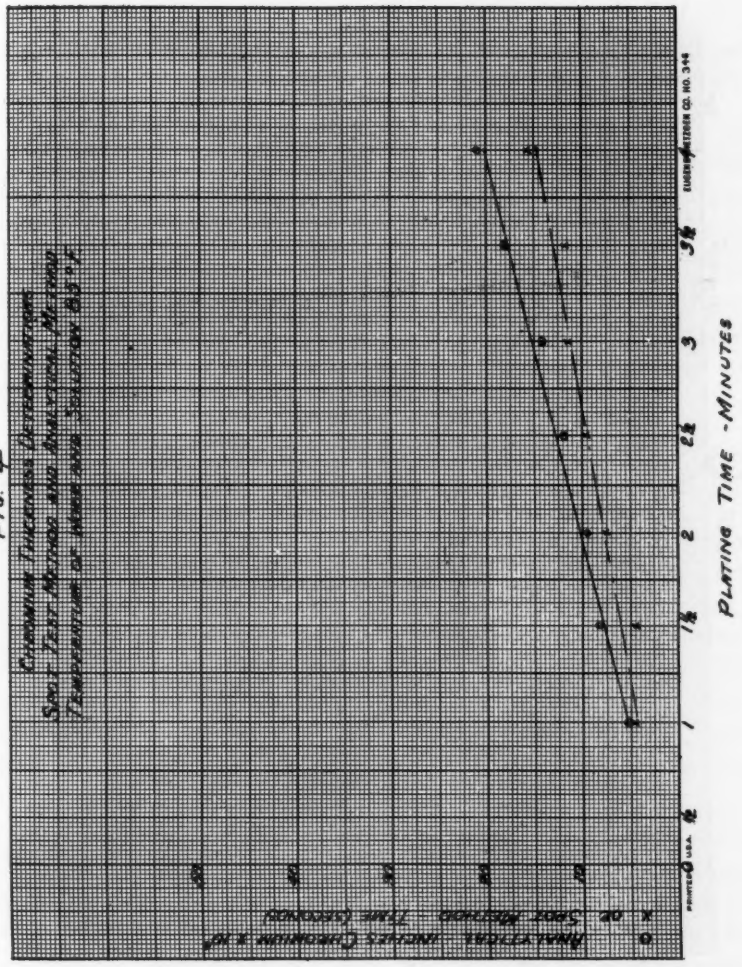


FIG. 4

CHROMIUM THICKNESS DETERMINATION
SPOT TEST METHOD AND ANALYSIS (AVERAGE)
THICKNESS OF NICKEL AND SOLUTION 85°F.

This method was checked against the analysis of the average thickness obtained by the chemical analysis method mentioned above and used by Pinner and Sperry.

Pieces of nickel plated steel 3 in. by 8 in. were chromium plated for varying lengths of time from one-half minute to four minutes. Checks were made on each side by both the spot test method of Clarke and the Chemical method. A cloth reinforcement ring was glued to the surface of the specimen after the chromium had

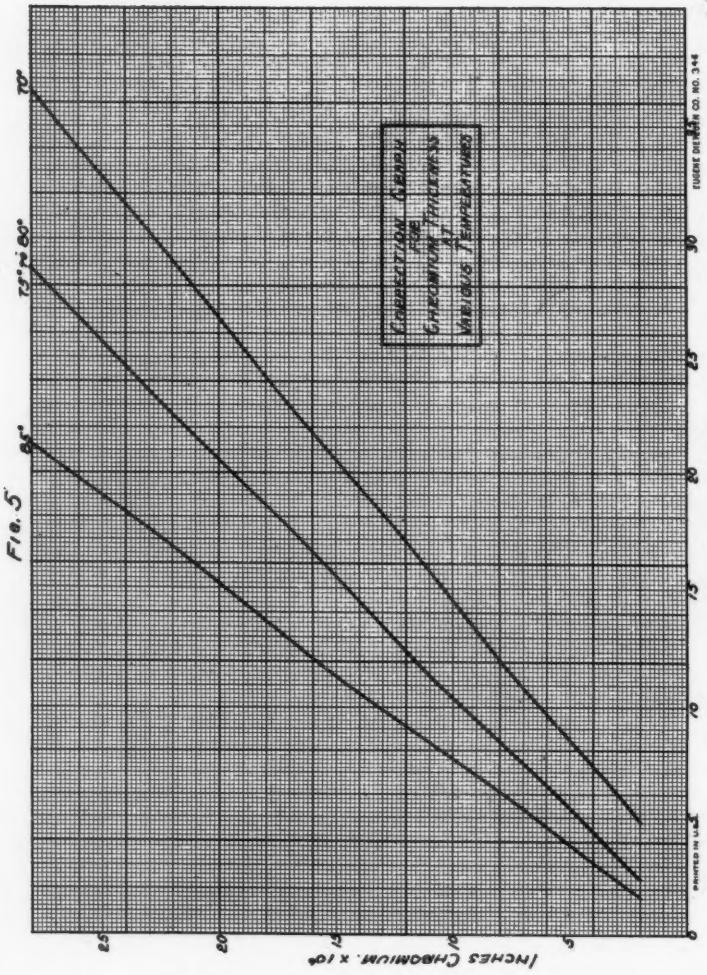


FIG. 5

been cleaned with a solvent to remove oils or greases and superficial dirt accumulation. The results obtained are shown in the curves.

Figures 1 to 4 show the comparison of the chemical method with the time in seconds for gas evolution in the spot method at four different temperatures of testing. These curves show that the rate of solution is greater at the higher temperatures and,

therefore, at 85°F. each second of elapsed time is equivalent to a greater thickness of chromium than at 70°F. They also show that at 75°F. - 80°F. each second is approximately equal to .000001 inches chromium.

Figure 5 is a composite of the other four curves replotted to read the thickness of chromium in inches with any given time of gas evolution read in seconds. This curve is useful for the routine testing of chromium thickness because if the temperature of the specimen and reagent is known the thickness can be read directly from the graph. If the temperature of the specimen and the reagent is 75°F. - 80°F., each second of time is equivalent to .000001 inches of chromium.

The solution is easy to use because when the chromium is entirely dissolved a black film is formed on the nickel by the Sb_2O_3 present in the reagent, and this film showing at the conclusion in the gas evolution is not to be confused with the film that forms over the chromium surface immediately prior to the start of the formation of gas bubbles. This makes the time of completion of the test more readily determined than when using hydrochloric acid alone. If action does not start immediately when the reagent is put on the surface of the specimen, it can be induced by touching the surface with a nickel wire, a piece of nickel plated material, or sometimes by the mere action of scratching the surface with the tip of a glass rod.

In summary, it can be stated that the reagent proposed by S. G. Clarke as a modification of the method of Pinner and Sperry and Heussner improves the spot method of testing the thickness of electrodeposited chromium, because the end point is definite, the method simple, the results sufficiently accurate for routine work and the factor to change seconds to inches of chromium is one for the temperature of the average laboratory where the test is being performed.

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Wing Your Way to Dayton
the Birthplace of Aviation

RESEARCH COMMITTEE MEETING

A meeting of the Research Committee of the American Electroplaters' Society was held at the Pennsylvania Hotel, New York on Friday, October 6.

The meeting was called to order by A. B. Wilson Chairman of the Committee.

There were thirty-eight present representing the National Bureau of Standards, Bureau of Engraving and Printing, International Nickel Co., Bell Telephone Laboratories, The Edison Co., Chevrolet Motor Corp., Chrysler Motor Car Co., United Chrome Co., Gerity Adrian Co., The Udylite Co., Hanson-Van Winkle-Munning Co., Racine Plating Co., General Spring Bumper Co., F. B. Stevens Co., University of Michigan, New Jersey Zinc Co., Chase Brass Co. Oneida Ltd., Standard Sanitary Corp., American Brass Co., Western Electric Co., Seymour Mfg. Co., Sperry Gyroscope Co., Carnegie-Illinois Steel Co. and others.

All subjects suggested by members of the various branches of the A.E.S., in reply to Mr. Wilson's recent letter were thoroughly discussed. The subjects having the most merit were acted upon as being worthy of consideration, at a meeting to be held in the near future. In the meantime branches wishing to present further subjects or members having worthwhile ideas regarding work that might be undertaken at the Bureau of Standards should communicate with the Chairman of the Research Committee at once. All those attending the meeting were optimistic regarding a continuation of Research work being done by the Society.

The time between the close of the meeting and the publishing of this issue is too short for us to give a complete report. This will follow in a later issue with the names of those attending both this meeting and the meeting of the Joint Committee which was held on Saturday, Oct. 1st. Dr. Blum presiding.

BOSTON BRANCH WANTS THE 1941 CONVENTION

At the regular meeting of Boston Branch, held October 5, it was voted to start a campaign at once to bring the 1941 Convention to Boston.

The "Hub Of The Universe" would be an ideal Convention City, with its historic background and numerous other attractions. The members of Boston Branch are enthusiastic about the prospects of being the entertaining city in '41, and are asking all branches to give them their support.

The branch meeting place has been changed from the Bradford Hotel to the Hotel Manger. The November meeting will be held at the Manger on the 1st Thursday of the month.

WALTER WEIKER'S LETTER REGARDING HONORARY MEMBERSHIP IN THE A.E.S.

Mr. W. J. R. Kennedy
93 Oak Grove Ave.
Springfield, Mass.

October 12, 1939

Dear Bill:

I would like to add any weight that my opinion might carry to that of "Charter Member" whose letter on Honorary membership appeared in the August REVIEW. He has certainly brought up a vital point in this matter.

All of us respect old age. However, the fact that a man is a plater and old, even if his age is great, is not sufficient reason for electing him to Honorary Membership in this society. There is a great need for a definite specification of the qualifications necessary to make a man eligible for this honor.

In view of this need for limitation I would like to suggest that the maximum number of Honorary Members permissible at one time be limited to ten. This would not, of course, affect our present Honorary Members but would mean that no more elections could take place until the list was below ten.

I would appreciate it if you would give this a place in the REVIEW so that we might learn the reaction of other members to it.

Yours very truly,
WALTER W. WEIKER

Alkali Cleaning *as it* Affects *the* Plating Industry

By L. C. CAMEL
Detroit Rex Products Company

Read at the Toledo Branch Meeting
October 5, 1939

THE cleaning of metals prior to electroplating has long been recognized as a difficult problem.

Langbein, in an article written many years ago on the subject "The Removing of Grease and Cleansing" stated:

"These two operations must be executed with most painstaking exactness because on them chiefly depends the success of the electroplating process. Their object is to remove every trace of impurities due to the touching of the hands or the manipulation in grinding and polishing and to get rid of the layer of oxide which is formed in removing the grease with lyes and other agents".

You will notice that he has mentioned in this article the use of lyes and other agents. This lye was potash, and he was referring to cyanide and acids as the other agents. The use of lyes or potash gave a certain measure of success as a cleaning medium for a good many years. However, mass-production lines, and the demand for cleaning more parts per day necessitated speeding up the cleaning process. This was the beginning of research and development in cleaning materials and methods for plating departments. The result was the development of special alkali cleaning compounds; materials which would wet the dirt more rapidly, emulsify mineral oils, and aid in better saponification of animal and vegetable oils.

In the year 1908, Charles Proctor, the founder of the American Electroplaters' Society, read a paper at the annual convention at Toronto, Canada, entitled "Electrochemical Cleaning Baths and Their Application". He described such procedure as follows: "The action of an electro cleaner is similar to the action of an electroplating bath. The only difference as far as the development of gases is concerned, is that no metal being in solution and the anode being insoluble, no metal is deposited. By using strong current, copious evolution of hydrogen gas is developed upon the articles, which attacks the organic matter upon the surface, practically lifting it off and by rapid evolution of the gas carries it to the surface".

Since this paper was read at the convention in 1908, tremendous strides have been made in the plating field with electric cleaners. Cleaners have been developed with high conductivity, carrying current as high as 250 amps. per sq. ft. and using line voltages up to 12 volts. Wetting agents have been developed that will withstand this rather harsh treatment and will continue to wet and emulsify oils and dirts over long periods of time.

Several factors must be considered to insure an efficient electrolytic cleaning set-up for the plating industry. Type of soil, type of metal to be cleaned, size of parts, current available, space available, etc., are some of the many factors which must be given attention. The soil may be animal, vegetable or mineral oil, soap, grease, abrasives, inorganic salts, shop dirt, or any combination of same. Soil is a very important factor, and as can be understood, is the most variable one. A manufacturer of only one item may have but a few types of these soils to remove as a routine practice, however, the job shop at some time or other will encounter all kinds. Thus the job shop must have a set-up which is adaptable for the removal of all soils.

It is good practice to have several cleaning tanks. The following is a brief description of a size and type of tank commonly used. It is made of sheet steel 3 ft. x 3 ft. x 6 ft. long, equipped with steam coils and an agitation shield. The steam coils should be placed on the side of the operator and be of sufficient capacity to heat the solution from room temperature to boiling in one hour. The agitation shield, as its name implies, furnishes agitation of the solution. In addition, it gives a directional flow to the solution, forcing the floating soil to one side of the tank where it may be easily removed by skimming or by a trough provided for the purpose. Most important of all, it provides a clean surface through which the work may be removed. The shield also increases the efficiency of the cleaning solution and requires less heat. It is made from a steel plate bent at a right angle so that it fits over the coils and reaches to within a few inches of the bottom of the tank. Holes about 3″ dia. on 6″ centers should be burned in the shield about 6 inches below the solution level through which the superheated solution will flow to produce the agitation.

The practice generally used in electric cleaning in the past was to make the cleaning tank itself the anode and use one copper rod as the cathode or work rod. This practice is finally being dis-

carded in most electrolytic tanks, in favor of individual anode rods and anodes. As oxygen is liberated at the anode on direct current cleaning, there is a tendency for steel tanks to rust and corrode very badly when used as an anode. However, this is overcome with the use of steel plates as anodes which can be removed from the bath and cleaned periodically, thus preventing the rapid rusting away of the tank. It is a simple operation to replace the separate anodes.

Some of the cleaning compounds found on the market contain materials which inhibit the flow of current in the cleaning operation, and may either totally insulate the tank, allowing no current to flow at all, or else reduce the current to the point where the efficiency of the cleaner is greatly reduced. We find that by using individual anodes such as sheet steel, as mentioned above, this may be mostly overcome.

Cleaning materials which contain considerable insoluble matter seem to be the worst offenders in creating insulation on anodes.

CONTROL

In making up a cleaning solution, it is advisable to fill the cleaning tank approximately half full of water and bring up to a temperature of at least 160 degrees Fahrenheit, preferably to a temperature of 180 degrees. Cleaner introduced into water at this temperature will usually go into solution at once, and provide immediate cleaning facilities for the operator. Never add cleaner to *boiling* water because of the danger of violent boil over. The usual range of temperature of cleaning solutions found in plating departments, is approximately 180 degrees F. to 200 degrees F. It is not always desirable to have an electrolytic cleaning solution boiling because of the excessive agitation that is produced by the combination of the gassing and the boil. Under such a condition much of the solution might boil over and out of the tank. Thus it is obvious that a temperature under the boiling point would be most satisfactory. In practice, a temperature of 200 to 205 degrees F., is frequently used.

With the facilities that are available today in modern plating plants for the control of plating solution, it is very simple to extend that control to the cleaning bath. In the maintenance and care of electrolytic cleaning solutions, it is very desirable to take a sample daily and check for concentration. This control may be carried on by a very simple method of titration and factors can be

obtained very easily for all types of cleaning materials. A simple method of titration is as follows: Pipette a 25 cc. sample of solution into a suitable container such as a beaker or flask and dilute with 50 cc's of water. Add a few drops of methyl orange indicator and titrate with a standardized acid, either sulphuric or hydrochloric. The actual titrating is carried on by allowing the acid to drop into the sample from a burette until there is a complete color change from yellow to red which is the end point, or, in other words until all of the available alkali has been neutralized. By reading the burette for the cc's of acid used and dividing that figure by the factor for the particular cleaner which you are using, the result will be in ounces per gallon of cleaner. For example, if 20 cc's of 6/10 normal acid are used and the factor of the cleaner is 5, then the total number of cc's of acid used divided by the factor will give the ounces per gallon of the cleaner, which in this case will be 4.

SELECTION OF CLEANING MATERIAL

The selection of cleaning materials in the plating department, depends a great deal upon the type of soil to be removed and metal to be cleaned. There are many types of metals to be cleaned such as aluminum and its alloys, the brasses and the bronzes, die cast metals, copper, nickel, etc. For instance, in cleaning aluminum it is necessary to use a material that will not affect the aluminum, or pitting and etching of the work will be encountered. The salt thus formed on the surface will prevent adherence of a subsequent coating.

In the cleaning of brasses and bronzes it is necessary to have a material that will wet out the buffing compounds, that will perform either with direct or reverse current, but will not tarnish the work to the extent that the tarnish cannot be removed in subsequent acid or strong alkali dips.

Steel, of course, gives the least amount of trouble. However, a cleaning solution having too high a caustic content will have a tendency to "burn" the steel or turn it brown.

Die cast metals, of course, fall into the same category as aluminum, and copper with brasses. Nickel is usually only cleaned after color buffing prior to chrome, but here again a cleaning material must be used that will not etch or tarnish or a bad chrome plate will follow.

Aluminum is one of the most difficult metals to clean for electro-

plating, and the ordinary alkali compounds should never be used on it. It should be cleaned with materials specifically built for the purpose of cleaning of aluminum parts.

In cleaning brass, the main point to be considered is the avoidance of tarnish. Brass is attacked in an alkali solution where the pH of the solution is above 11. Zinc metal is readily dissolved by alkaline solutions of a pH greater than 10. The presence of ammonia aids such corrosion and the old practice of adding ammonia salts to platers cleaners is not to be recommended.

The die cast metals which we are called upon to clean from time to time, consist principally of zinc usually alloyed with copper, aluminum, etc. These metals are very sensitive to alkalies and are often attacked even by boiling water. They are of a porous nature which increases the difficulty in cleaning them. This porosity not only makes complete removal of the soil most difficult, but also the subsequent removal of cleaning solutions from surface capilaries by rinsing.

Polished and buffed surfaces which have been deeply cut are especially difficult, inasmuch as the surface skin of castings is much closer grained than the underlying metal. When this is cut through, numerous and sometimes relatively large pits and holes are uncovered. Thus, polished parts must be cleaned quickly to avoid excessive attacks, and the cleaning solution should not be over 180 degrees F. However, in some instances a slight etching in the alkali solution is often desirable inasmuch as this produces a surface to which the subsequent plate will adhere better.

In the cleaning of steel and iron, various alloys are encountered but fortunately all of them except some of very high silicate alloys are not attacked by an alkali solution. Their surfaces are usually dense and non-porous and this makes the choice of the cleaning material easier since the soil only must be considered.

Due to their rusting tendency, steel and iron parts are generally coated with an oil chosen for its ability to form an adherent protective film, often very difficult to remove. This presents a difficult problem in cleaning articles such as pressed stampings and other fabricated sheet steel parts. Such steel when worked hot and quenched in oil presents another difficult cleaning problem. Steel which has been mechanically worked has dirt forced into the surface and one of the most common soils of this nature

and one of the most difficult to remove is the lime compound found in the wire industry.

Alkali cleaning materials will not remove all these lime compounds, however, they will remove the oil or binders that are used with these compounds but they leave a very adherent coating of lime on the steel. A very quick method commonly used in production processes is to follow the cleaning operation with a muriatic acid pickle which will immediately dissolve the lime film.

One of the most important phases of electrolytic cleaning is rinsing. Work removed from an alkali cleaning bath carries out not only alkali solution but emulsified oils and dirt from the bath as well. This work should be thoroughly rinsed in a cold water rinse. The rinse tank should continuously overflow to prevent too much contamination from the work. Furthermore, the rinse tank may be agitated by the addition of air, if desired, in fact it is preferable to have agitation to facilitate washing off or slushing off any particles of solid matter that might be adhering to the surface. The rinse is especially important when removing soap and saponified oils prior to an acid pickle operation. Soils of this nature when not completely removed, react with the acid and oil and fat are released. The troubles caused by such fat and oil in the acid bath are too obvious to discuss further.

Up to now the history and mechanics connected with the electro cleaning of metals, procedure, and control have been discussed. Now, let us consider the most important properties that are desirable in an efficient and effective electric cleaner. They are as follows:

1. High current carrying capacity.
2. Good wetting and penetration, low foaming, free rinsing.
3. Good emulsifying and dispersing properties.

We will briefly discuss the above points in the order named.

(1) *Current Carrying Capacity*

From the standpoint of current conductivity caustic potash rates highest, then comes caustic soda, followed by alkaline salts of potassium and sodium. From the cleaning standpoint they are not desirable alone. The conductivity of the electrolyte increases almost in direct proportion to the temperature rise. High temperature, therefore, is desirable for two reasons, namely, it aids in the cleaning action and it increases the electrical efficiency.

When the temperature is constant the conductivity increases as the concentration is increased up to a certain limit beyond which the conductivity decreases. It is evident then that concentrations beyond a certain point are valueless from the conductivity standpoint and may even be harmful. An electrolyte with a high pH such as caustic soda or caustic potash cannot be used on many types of work, instead, the salts of these bases are used. (pH is a symbol used to denote degree of acidity or alkalinity. Distilled water is neutral and has a pH of 7. The pH scale runs from 0 to 14. From 0 to 7 we have decreasing acidity and from 7 to 14 we have increasing alkalinity. pH is measured by electrical means, and with indicators such as cresol red).

Best results are usually obtained by mixing the alkaline salts with varying percentages of caustic soda depending on the type of soil to be removed and metal to be cleaned. On non-ferrous metals a lower pH is required than on ferrous work. The most commonly used inorganic materials are the carbonates, phosphates, silicates, and borates of sodium. Pyrophosphates are sometimes used but are relatively unstable when used in combination with other salts having a high pH. The degree of ionization of the more complex alkaline salts is usually low. (By ionization we mean the tendency of materials in solution to dissociate or separate into positive and negative ions. The greater this separating or splitting up the greater is the ability to carry current). Thus the more complex alkaline salts are poor conductors and in many instances their contribution to the cleaning mixture is nullified by the lowering of the conductivity, which lessens the gassing action.

(2) *Wetting and Penetration*

The rapid action of electric cleaning is based on the principle of liberating gas. This gas is formed where the electrolyte contacts the pole and as the bubble increases in size expells the soil particle. Thus it is necessary for the electrolyte to wet and penetrate through the soil to the surface of the metal. Where the soil is a non-conductor and not rapidly wet by the electrolyte the cleaning action will be considerably lessened unless an agent for increasing the wetting power of the solution is introduced.

These wetting substances may be roughly divided into two classes, the soaps and the surface acting agents better known as wetting agents. Since soaps are also good surface acting agents, we will distinguish between the two by considering soaps to be

those which react with hard water salts to form an insoluble material. The wetting agents will be those which lower the surface tension of the electrolyte but which do not react with hard water salts. (Hard Water is a term applied to water that contains principally soluble magnesium and calcium salts. The hardness is usually expressed in degrees of hardness and in grains per gallon. The hardness is easily determined by a simple procedure using a standard soap solution and noting the amount required to give a permanent foam in a definite quantity of the water in question.

Hardness is divided into two classes, temporary and permanent. Temporary hardness is caused by the bicarbonate compounds and may be removed (softened) by boiling. An example is the scale formed in a tea kettle. Permanent hardness is not removed by boiling but forms a precipitate with alkalies. Where the water is hard, a considerable portion of the cleaner will be spent softening the water. This accounts for the divergence in results of a cleaner in soft water and hard water).

The addition of soap to an electrolyte lowers the conductivity. When an electrolyte of high conductivity and concentration is used, soaps generally cannot be used because of excessive foaming. Most soaps form a bubble that has a tenacious film and tends to blanket the released hydrogen and oxygen gases, causing the tank to overflow. This action is more pronounced when the electrolyte is boiling. When a heavy blanket of foam is allowed to form, a peculiar accident may occur. A spark from the bus bar may detonate the gasses followed by violent splattering of the solution. The animal fat scaps form the most tenacious bubble whereas soaps such as Rosin form a fairly brittle bubble. There are several materials which have powerful foam suppressing ability (such as tri butyl phosphate) but unfortunately these dissipate rapidly at high temperatures. As a rule wetting agents lower the conductivity less than a corresponding amount of soaps.

The lack of stability in a highly alkaline medium is the objectionable feature to most wetting agents. Only a very few of them will not decompose under the high temperature and high pH imposed by electric cleaning. Generally the bubbles produced by wetting agents are more brittle than those formed by soap, also wetting agents will wet an oiled surface faster and penetrate soil more rapidly than most soaps. Some wetting agents are difficult to rinse. Those with a high rate of adsorption are hardest to

rinse from the work being cleaned. (By adsorption is meant the tendency of a material in a solution to collect on the surface of a solid. An exaggerated example is a magnet in a solution containing finely divided iron particles. Adsorption and wetting are related. Soaps and wetting agents vary widely in their rate of adsorption. The lower the rate of adsorption, the longer the life of the saponacious material other factors being equal). High adsorption becomes objectionable especially in a plating sequence causing poor adherence. When the rate of adsorption is low the wetting agent rinses freely producing no undesirable after effects. In this respect, it is superior to soaps because in very high dilutions soaps tend to hydrolize and leave a very thin oil film. A flushing rinse will greatly overcome this tendency. When caution is used in the selection of wetting materials, the increased cleaning efficiency more than compensates for the decreased conductivity.

(3) *Emulsification and Dispersion*

When the soil is removed it must be emulsified and kept dispersed throughout the cleaning solution to prevent redepositing on the work. The emulsifying action of the electrolyte is greatly enhanced by soaps, wetting agents, and other materials which will reduce the interfacial tension between the soil and the electrolyte. The agitation produced by gassing assists the emulsion process. Certain alkaline salts have colloidal properties and tend to stabilize the dispersed soil. This action keeps the soil finely divided throughout the solution and prevents the possibility of oil floating on top of the solution, through which the cleaned work must pass on removal from the electrolyte.

Many organic materials have been used in conjunction with high alkaline mixtures to lessen the tarnishing on non-ferrous metals. These materials lessen the tarnish for a short time. However, after several days use most of them break down under high heat and high pH producing undesirable results.

No one mixture is a cure all. Such factors as the type of soil, type of metal, precleaning set-up if any, time available, and many others, influence greatly the composition of the mixture and should be carefully considered for most efficient and effective results.

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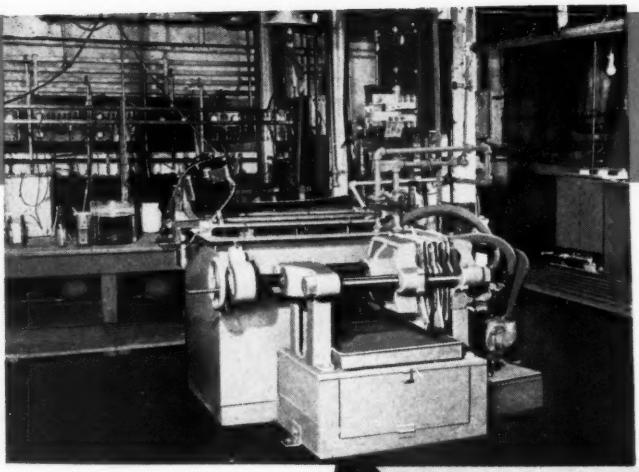
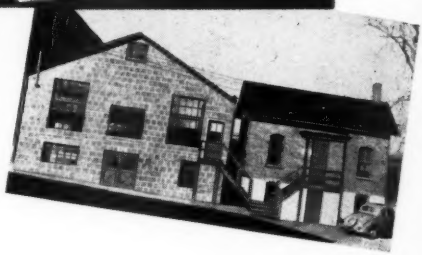


An interior view of a section of the H-VW-M Laboratory and an exterior view of the buildings devoted to research and experimental work



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The Experimental and Research Laboratories at our Matawan plant is devoted exclusively to *progress* in electroplating methods, equipment and supplies.

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No new product is added to the H-VW-M line until it has received our Laboratory's approval — no operating or process data is recommended without Laboratory study and sanction.

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BRANCH NEWS

Business and Social News | Educational Activities

AMERICAN ELECTROPLATERS' SOCIETY

Bridgeport Branch. The regular meeting of the Bridgeport Branch was held Oct. 5, in the Chamber of Commerce Rooms in the Stratfield Hotel. The meeting was conducted by Pres Wm. Ehrencrona and about 30 members were present.

A motion was made and carried to accept the report of the outing committee. The committee was glad to report that the net loss to the branch was only $21.30. A good time was had by all at the outing.

Dr. Meyer reported the research committee will hold a meeting Oct. 13.

The branch was sorry to hear that Bill Flaherty had been ill. He has now recovered and is back on the job.

A letter was read from E. T. Candee regarding the Research Committee and was placed on file.

The applications of John Deamico, Forsberg Mfg. Co. and Stavin Pochna, Acme Mfg. Co. were read and ordered to take the usual course.

Thomas H. Wilber, Bullard Co. and Albert V. Kassery, Durable Metal Products Co. were elected to membership.

Treasurers report was read and accepted.

Librarian, Clarence C. Helmle has arranged for an open meeting Friday, Oct. 20, at which time Mr. R. H. McCahan of E. I. Dupont will speak on "Moly-Black", a new Nickel Molybdenum Black Electroplated finish.

President William Ehrencrona asked as to what was planned regarding chemistry class for the coming year. Chick Helmle will canvas members regarding a course and if they desire he will make an effort to make up a class to be held under the sponsorship of the Bridgeport Engineering Institute.

Librarian Clarence Helmle opened up the educational period. This turned out to be a round table discussion of general plating problems regarding the plating of different metals.

Meeting adjourned at 10:30 P. M.

EUGENE PHILLIPS, *Sec.*

Hartford Branch. The Hartford Branch of the A.E.S. held its first fall meeting on Monday evening, Sept. 18, 1939 at the Elks' Club, Bristol, Conn.

The meeting was called to order at 8:00 P. M. with President Backus in the chair. Minutes of the last regular meeting, as well as a report on the Hartford Branch's outing of June 26 was read and accepted. All communications were read and placed on file. One bill for our per Capita Tax was voted paid. One application from Mr. Kenneth Bellinger for associate membership was voted on for publication.

Mr. J. W. Backus was selected as Chairman of the membership Committee. A brief discussion of the fall branch activities was discussed.

Mr. E. T. Candee gave a few remarks on the subject of research, citing the letter sent out by Mr. Wilson, Chairman of the Research Committee.

Mr. B. H. McGar, Assistant Director of Research at the Chase Brass and Copper Works of Waterbury, Conn. gave a very interesting talk on "Recent Developments in the Non-Ferrous Industry".

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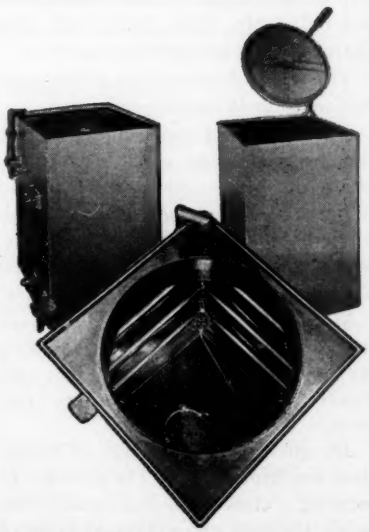

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The meeting was attended by only seventeen members and visitors and was adjourned at 10:30 P. M.

VERNON E. GRANT, *Secy.*

Los Angeles Branch. The Los Angeles Branch of the A.E.S. held their regular monthly meeting September 13 at the Rosslyn Hotel. President Ray Bray presided.

Meeting was called to order at 8 o'clock P. M.

Minutes and Financial report of previous meeting were read and accepted. Bills were ordered paid.

Mr. Maurice R. J. Andrews was elected as an active member of the Society.

A friendly and interesting letter from Mr. G. B. Hogaboom was read. Other communications consisted mostly of letters requesting committees be appointed. Mr. Earl Coffin will take charge of the membership committee.

The research committee of last year will continue in that capacity.

Mr. C. C. McLaren made a motion that we inject some social life into our affairs out here — such as picnics and so forth. This suggestion met with whole-hearted approval, whereby Mr. McLaren was promptly appointed Chairman of the Whoopie Committee.

Mr. Rynkofs and Mr. Lamoureux are still carrying on communications with the Los Angeles Bureau of Light and Power regarding the exposure test racks.

The question of organizing a Chemist class was brought up. The problem of securing a class room was turned over to Mr. Rynkofs who will report in detail at the next meeting.

The following questions were found in the Question Box:-

Q. A Rochelle copper bath operated at 130°F. and pH of 12.5 produces dark streaks and a hard plate on the work. Could an excess of carbonate cause this?

A. Yes. Also a high metal content and suspended matter could be responsible. Recommend increase in the free cyanide and filtration of the solution.

Q. I would like to know a method of removing lard oil and stamping oil from brass, steel and die castings. The parts to be cleaned are very small and have very deep recesses.

A. Several pre-cleaning methods are recommended here: Vapor degreasing, emulsion degreasing, or hot tank pre-cleaning. Consult a representative of a reputable cleaner supply house.

Q. After dealing with bright copper, cadmium, zinc and nickel, what causes black spots before your eyes?

A. (General Laughter). Consult an optimistic optometrist.

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Meeting adjourned at 11.30 P. M.
RAYMOND SOLIVAN, *Sec.-Treas.*

Grand Rapids Branch held their first meeting following the summer vacation September 14, 1939 at the Rowe Hotel with President Werft presiding. In the absence of Secretary Whalley, Mr. Werft was assisted by Mr. Homer Morton, our Vice President.

The guests for the evening were Mr. Preston of the Grand Rapids Brass Company and Mr. H. B. Kennedy of Dupont Company, member of Detroit Branch.

Mr. Chester Smith who is chairman of our Exhibit Committee showed the members a picture of our Convention Exhibit, and it was very good. He has also accepted the chairmanship of the Membership Committee for the coming year.

Mr. Maurice Caldwell, Chairman of our Educational Committee reported that he would have speakers for our 1939-40 meetings.

The meeting was then turned over to our Librarian, Mr. Smith who found the following in the question box:

Q. What kind of lead anode is best for chromium plating?

A. United chrome has patent on lead-tin anode, Telurium anode not satisfactory for hydrofluosilisic bath. Lead-Tin or Lead-Antimony best.

Q. Is there any sure cure for lacquer spotting out?

A. Mr. Werft says no anti-spot lacquer is 100% sure to prevent spotting-out. Rinsing treatment of work after plating is the main factor. Some people put on water dip lacquer and cotton lacquer over it. This is most satisfactory. Smith says one of the greatest troubles is with brass plating of steel. Some people nickel under the brass plate.

CHARLES S. WHALLEY, *Sec.*

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Toronto Branch. The Toronto Branch opened its fall meetings on September 18 at the King Edward Hotel with President Acheson presiding. Thirty nine members and their friends attended.

Mr. Acheson regretted the absence of Mr. Fred Fulforth and stated that the pictures on "Visual Story of Steel for Plating Purposes" were on hand and with the aid of Mr. Albert West to handle the machine Mr. Acheson would read the paper himself.

Secretary Harry Hands stated he would be obliged to give up his office in the Branch. He is going out of town. The members regret his leaving and complimented him on his faithful service to the Branch these past four years. They all wished him success in his new position.

Mr. Graham gave out the annual

auditor's report and it was received with thanks for the trustees.

Mr. Jack Walker was appointed membership Secretary and the members expect big things from Jack.

Mr. Allen Byers was elected as the new Secretary-Treasurer to succeed Mr. Hands. Letters were read from Mr. A. B. Wilson, Mr. Nelson F. Sievering and Mr. R. M. Goodsell.

One member was suspended.

Six pieces of cold rolled steel were on display and along with the moving pictures operated by Mr. West; the reading of the paper by our President; the demonstration and explanation of the advantages of this fine Cold Rolled Steel by Mr. Young of the Westinghouse Company in Hamilton and Mr. Byers of the Canadian General Electric Co., this was a very interesting meeting. The members showed their appreciation to the President for his efforts in making this meeting so worthwhile.

The meeting adjourned at 10.30.

J. S. CAIRNS

Detroit Branch meeting of September 8, 1939.

QUESTION BOX

Q. If one wished to plate bright deposits of nickel, copper and nickel, in the order given, on steel, is any trouble to be anticipated in getting satisfactory adhesion of the bright copper deposit to the first nickel coating?

A. Automotive grilles are being replated without removing the original bright nickel deposit by striking in ordinary cyanide copper solution, then plating in bright copper. Generally speaking, the same precautions should be taken as when plating bright copper on steel.

Q. What are the causes and remedies for the rough non-adherent deposits from alkaline tin solutions?

A. This condition is almost always caused by the presence of stannous ions in the solution. The immediate remedy is to oxidize the stannous tin to the stannic state by making small additions of hydrogen peroxide. One should then remedy the cause for the formation of the stannous tin which is usually either too large an anode area or too high a free alkali content.

Q. What are the advantages and disadvantages of anodic cleaning of zinc base die castings?

A. A very interesting and informative discussion resulted from this question. It was pointed out that anodic cleaning of die castings had been used for some time as an adjunct to cathodic cleaning, but that recently die castings were cleaned with very satisfactory results without any cathodic cleaning whatsoever. The theory was advanced that anodic cleaning was especially useful in cleaning die castings which

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0.9—1.5 (copper, etc.)	silver)
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were to be baked subsequent to copper, nickel, and chromium plating, because hydrogen absorption which might later cause blistering was avoided.

It was pointed out, however, that widely varying procedures were being used for cleaning die castings with good results. In cleaning die castings anodically, the use of suitable compounds is quite an important factor.

Q. What causes anodes to turn black in the following cyanide copper solution?

Copper	2.0 oz/gal.
Free cyanide	0.7 "
Rochelle salt	4.0 oz/gal.
Temperature	140°F

A. The following possibilities were enumerated. (1) Polarization of anodes caused by excessive current densities. (2) Quality of anodes. (3) Incorrect pH of solution. (4) Presence of lead or other metals in the copper solution.

Q. Why is it generally thought that there is a saving in the use of bright nickel solutions? In other words, where is the saving if any?

A. A number of members pointed out that in many plants large numbers of buffing wheels were idle. This speaks very strongly for the saving in buffing costs.

When bright nickel is used without buffing, nickel is not removed from sharp corners which removal causes poor resistance to corrosion.

It was also pointed out that a number of articles are now being designed and plated in bright nickel which would be impossible to plate otherwise.

R. B. SALTONSTALL
Librarian-Detroit Branch

Buffalo Branch. The first regular meeting of the winter season of the Buffalo branch took place September 15, at the Stratford Arms Hotel.

The meeting was called to order by the President Mr. J. Ruff. The minutes of the June meeting were approved as read. It was decided that in the future, we will meet on the second Friday of each month to permit interchange of ideas with the Rochester branch which meets each third Friday. It was hoped that both branches will benefit from this.

We were glad to have Mr. J. Acheson of the Toronto branch with us and the feasibility of having joint meetings throughout the year was suggested and will be discussed more fully at some future date.

Mr. W. Hart offered to take over the chairmanship of the membership committee and the President gladly accepted his offer.

The regular business being concluded, the President introduced the guest speaker, Mr. Frederick Fulforth, vice President of the A.E.S. Mr. Fulforth gave a brief outline of the activi-

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ties of the society in general and commented on the benefits to be derived from advertising in the MONTHLY REVIEW. He then gave his talk on "Steel Plating". His talk was very comprehensive and covered the subject from the rolling-mill to the finished product. He emphasized the various points by means of motion pictures which added greatly to the interest in his address.

At the conclusion, the members present had a much clearer conception of the operation of a modern steel plant with all its specialized equipment.

Mr. Fulforth was called upon to answer several questions and the usual discussion followed. He was given a hearty vote of thanks and it is to be hoped that we may again be fortunate enough to secure his services in a similar capacity.

The meeting adjourned at 10 p. m.

RODERICK MCGHEE, *Secy.*

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Newark Branch. The regular meeting of the Newark Branch of the A.E.S. was held on Friday evening, August 18th at the Club Room of the Hotel Douglas, Newark, N. J. The meeting was called to order at 8:30 P. M. with President John Kotches presiding. Due to the absence of the Secretary, Mr. Paul Oldam was appointed Secretary *protem* for the evening. The only other officer present was Stephen Leshnick, Sargent-at-arms.

The minutes of the previous meeting were read and approved.

A communication from Mr. Nelson Sievering, 3rd Vice-President of the Supreme Society, was read and upon motion duly made and seconded it was decided that this request be complied with.

A communication from Mr. Oliver B. J. Fraser regarding his resignation was read and accepted.

A communication from Mr. Wm. J. R. Kennedy was received with reference to retracting applications for Mr. Wilson and Mr. Fadgen of Ternstedt Trenton Division Co. These applications had been erroneously received by Newark Branch. A copy of a letter to Mr. Kennedy from our Secretary, George Wagner was also read. This letter stated that he was returning the applications as requested.

Applications for Mr. John Yarmack and Mr. Carl Greiner were voted to take the regular course.

Mr. John Kotches reported that Newark Branch's Annual Picnic will be held on September 30th at Vogel's Grove in Union, N. J. Adults $2.00; Children $1.00.

The Report on the Annual Fishing Trip stated that the trip was very successful. Everyone caught a sardine and no one was sick.

Upon motion duly made and seconded it was decided that Newark Branch would pay in the neighborhood of $50.00 for the printing of a 1939-1940 Educational Program in which will be included a simplified method of Plating Solution Analysis.

For the balance of the evening a Question Box was conducted by Paul Oldam, some of the questions asked were as follows:

#1 Discussed recent patent process to anodize aluminum without current.

#2 How to obtain irodescent rose gold effects.

#3 Stripping Die Cast Metal to avoid opening of pores of the Die Cast.

#4 What will Sodium Acetate do in a Cadmium Cyanide Solution?

Meeting adjourned at 10 P. M. 18 members were present.

PAUL A. OLDAM,
Secretary Pro Tem

Montreal Branch. The Montreal Branch of the A.E.S. held its regular meeting on September 7th, 1939 at the New Carleton Hotel.

Apparently the summer activities of some of the members have not terminated yet, there being but ten members answering the roll call, following the opening of the meeting by President Chas. Doherty at 8.30 P. M.

The minutes of last meeting were read and adopted. The usual business was despatched in detail and the membership committee's report accepted.

The educational board with H. S. Jordan as chairman disposed of the question box in good order. The usual shop talk saw the meeting adjourned at 10 P. M.

A. W. JEROME, *Secy.*

Rochester Branch regular monthly Executive meeting was held on Thursday night August 24. Regular business was transacted. The application of Mr. Lyndon H. Wells for an associate membership was then read and he was duly elected. The request of Mr. John Honnecker for a transfer to the Cleveland branch was then read and with deep regret that John found it advisable to transfer, the transfer was made out. Bills were then presented and ordered paid. The report of the committee for the joint picnic, Mr. G. A. Lux, chairman, was then given and outside of a few minor details everything was reported going fine. As all business matters had been covered the meeting was then adjourned.

On Sept. 9th a group of 26 Rochester members took a bus ride to Buffalo to attend the Joint outing. It was an ideal day and everyone was in the best of spirits. Even the transportation

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committee, meaning yours truly, had however made a slight error in notifying the bus company as to the rendezvous thereby making everyone wait almost a full hour before starting. However the spirits were still high. At Buffalo we found the Buffalo committee had done an excellent job in selecting Bauers' Grove for the outing and in preparing for the party.

The baseball game between Buffalo and Rochester was a high light of this outing, everyone enjoying it immensely. There were plenty of eats, plenty to drink and lots of fun for everyone. We were particularly pleased to see Supreme Secretary Bill Kennedy and Supreme President Ray Goodsell at this outing. Come to Rochester next year. At eight o'clock the party broke up with everyone tired but satisfied that they had had a swell time. Good work Buffalo.

On Sept. 15th the Rochester Branch had as its guest speaker Mr. William (Cyanide Bill) Schneider of the E. I. duPont de Nemours Co. His topic was "Moly Black" a subject which was of very great interest to all and "Bill" certainly made it interesting with his display of finished parts and his highly interesting comments. After the reading of the paper he was bombarded with a host of questions as to various uses for this particular finish and its application. We also had as guest Mr. C. M. Hoff of the duPont Co. who assisted or rather augmented "Bill's" answers to the questions. This paper will be available for publication in the near future so we will not elaborate further except to say we appreciate "Cyanide Bills" efforts in our behalf. Come again "Cyanide Bill".

JUDSON R. ELSTER, *Sec'y.*

Toronto Branch met October 6th at King Edward Hotel. This was the first meeting after the change in time from the fourth Monday to the first Friday of each month.

President Acheson opened the meeting, previous minutes were read and also a letter from Mr. W. J. R. Kennedy.

One application for membership was received and seven copies of the Convention Proceedings were ordered.

Our President spoke of the Chemistry Class for this fall and he will give further information at our next meeting.

President Acheson introduced Mr. W. Price as speaker of the evening.

Mr. Price displayed fifty small samples consisting of hardware for window shades and blinds; base metals of zinc die castings and steel and brass with deposits of copper, brass and nickel - some of which were oxidized and nearly all were lacquered. He also showed racks made out of scrap; articles plated in barrels and still tanks; ball burnishing, etc. Mr. Price gave a very interesting talk and answered all questions in detail including explanations on soaps, balls and different kinds of sawdust. At the end of his talk he was given a hearty vote of thanks. Mr. Price is a member of Toronto Branch.

What was the matter on Friday night? We missed the Hamilton gang and also some of the other members. Was it because of Thanksgiving? We hope members will kindly remember our meetings on the first Friday of each month.

Meeting adjourned at 10.40 P. M.

J. S. CAIRNS, *Sec.*

Dayton Branch. The regular monthly meeting of the Dayton Branch was held at the Engineers' Club on Friday Oct. 6th.

Many of those present were ac-

companied by their wives, since it was decided at the last meeting, that our regular meeting night each month would also be the best opportunity for the ladies to get together to discuss their plans for the Convention in 1940. They are much enthused about the job that they have to do and under the able guidance of Mrs. Conley and Mrs. Cochran, can assure the visiting ladies of a pleasant time during their stay in Dayton next June.

The problem of a suitable Research Program for the coming year was brought up for discussion, during the course of which Mr. Fraine, who was for many years Treasurer of the Research Committee told of the history of the Committee and some of the problems that they have encountered and also of the contributions they have made to the plating Industry. Although no definite subject was suggested it seemed to be the opinion of those present that what was needed was not the smaller problems that are not of general interest, but some major problem that would be of interest to the Industry as a whole.

Following this discussion Mr. Conley gave those present a resumé of the work being done by the various Convention Committees and the progress they are making. Opinions were asked from the members on several subjects and it seems that all the Committees are making satisfactory progress.

At this time the business meeting was adjourned and the ladies joined the men for a luncheon which was served in an adjoining room.

Our worthy President Mr. Conley seemed well pleased with the quality of the repast and I am sure that he has no complaints about the quantity. . . . Ohmer Stephens' first remark when he arrived was that there were several ladies present that he had not met. Of course this was what you could expect from Steve. . . . This matter having been taken care of, he and Mr. Fraine sat down for a discussion that would no doubt have looked good in a column titled 25 years ago today. They were in the game at that time, both being among the first members of the Dayton Branch and, having taken part in the Convention in 1915 are looking forward to their second National Convention next year. . . . We all hope for a speedy recovery for Mrs. Smith, wife of Lewis Smith, Chairman of the Exhibits Committee. Mrs. Smith has been ill and we all sincerely hope that she will be able to attend some of our meetings in the near future. . . .This get together broke up at a late hour. . . . Billy Brandt and Clarence Folz were so engrossed in some plating problem(?)

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that they didn't realize it was over until they were alone in the room.

CORLISS W. POWELL, *Sec.*

Cincinnati Branch. The regular monthly meeting of the Cincinnati Branch, American Electroplaters Society, was held Thursday evening, September 28th, 1939, at 8:00 P. M., in the Hotel Metropole.

The minutes of the previous meeting were approved as read.

There were five applications for membership in the Cincinnati Branch. Millard Littrell of the Auto Sun Products Company and William Dammert of the Auto Sun Products Company made applications for Active Membership. Charles Clark of the Egyptian Lacquer Mfg. Company, Eugene Foster of the Auto Sun Products Company and Malcolm Kortright of the Auto Sun Products Company made application for Associate Membership. A motion was made and seconded that these applications be referred to the Executive Board to take their regular course.

The 1939 Convention Proceedings were distributed to those members present. Mr. Owen Towner gave a report of our visit to the Dayton Branch.

A motion was made and seconded that Mr. Fred Vogel try to secure Mr. Leroy Beaver as a speaker for some future meeting.

The rest of the meeting was turned over to the speakers for the evening. Mr. John Daymude and Mr. Edwin Fait. Mr. Daymude gave a talk on Cadmium Plating and Solution Control, passing out mimeographed copies on same. Mr. Fait gave a talk on cleaners and had slides demonstrating the effects of different cleaning methods. The members of this Branch seem to like this idea of passing out these mimeographed copies before the talk. Two of our members offered to have future talks mimeographed for the meetings.

The writer suggests that other branches not having tried this do so as this is an excellent way to stimulate interest in the meetings.

The following questions were not answered satisfactorily:

1. *What causes pitting in Cadmium Plated work?*

2. *How to get brown oxidation on Cadmium Plating similar to Statuary Bronze?*

MARTIN GANNON, JR., *Sec.*

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Cleveland Branch. The regular meeting of the Cleveland Branch was held Saturday night, October 7th, in Parlor 34 in the Hotel Cleveland. The weather was fair and warm. Attendance 44.

Meeting was called to order by President Matts at 8:20 P. M.

The application for active membership of Christ Vargo, of the American Stove Co., Cleveland, Ohio was received and referred to the Board of Managers.

Mr. John Honnecker presented his transfer from Rochester Branch and was welcomed into membership in the Cleveland Branch by President Matts.

Mr. Geo. B. Svenson, Chairman of the Membership Committee, spoke briefly on the plans for increasing the Branch Membership. He announced that Messrs. O'Berg and Turk had been appointed on his committee. This George-Bill-Jack combination should be a "Go-getter" and prove a big help to Mr. Sievering in his National Membership Drive.

Chairman Scott, of the Silver Jubilee Committee issued tickets for the party to each member present and gave a glowing account of the completion of the plans for the celebration. Mr. Scott has asked that the report on the tickets sold be ready for the November meeting.

Mr. R. J. Morrow, a newly elected member of Cleveland Branch, was present and was welcomed by President Matts.

The Secretary had the 1939 Convention Proceedings on hand and issued them to all members present. This volume proved to be well printed and the Supreme Society is to be congratulated on the fine looking volume they turned out.

President Matts introduced the speaker of the evening, Dr. C. J. Wernlund, of the duPont Company, who spoke on the subject: "Fifty years Progress in the Electroplating of Zinc". This proved to be a very interesting and instructive talk which traced the improvement made in zinc plating from the old types of sulphate and cyanide baths up to the present day Bright Zincs. An extended period of applause was given Dr. Wernlund upon the completion of his address.

Librarian Hull announced that Mr. G. Soderberg, of the Udylite Company, would be the speaker at our November meeting.

Meeting adjourned at 10:20 P. M.

P. R. LYONS, *Sec.*

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Newark Branch. The regular meeting of the Newark Branch of the A.E.S. was held on Friday evening, September 15th at the Club Room of the Hotel Douglas, Newark, N. J.

The meeting was called to order at 8:30 P. M. with president John Kotches presiding. Other officers present were George Wagner, Secretary; Paul Oldam, Librarian and George Reuter, Trustee.

The minutes of the previous meeting were read and approved.

A communication from Mr. MacStoker, Secretary of New York Branch, with reference to a joint banquet in 1940 by the Newark and New York Branches, was read and turned over to the Banquet Committee.

A communication was read from Mr. A. B. Wilson, Chairman of the Research Committee, with reference to the branch presenting problems for investigation by the Research Committee during the year. The problems are to be presented at a meeting of the Research Committee on October 13th at the Hotel Pennsylvania in New York City. This communication caused a lot of discussion by Mr. G. Byron Hogaboom, Mr. Philip Sievering, Mr. Louis Donroe, Mr. Paul Oldam and a few more of the members suggested some problems which they thought should be taken up by the Research Committee. It was finally decided that Mr. Philip Sievering be appointed Chairman for Newark Branch and communicate with all the members thru a circular letter asking them for suggestions for problems for the Research Committee to work on. The results are to be presented by Mr. Sievering at the Research Committee meeting. The Secretary was instructed to answer Mr. Wilson's letter advising him that Newark Branch was taking an active part in this matter.

An application for Mr. Octavius Knight to Associate Membership was voted to take the regular course.

Mr. Horace H. Smith made a final and financial report on the Convention. All the members were pleased with this report and Mr. Smith was given a hearty round of applause. He next asked the members to come out strong on Sept. 30th to our Annual Picnic at Vogel's Grove, Union, N. J. Mr. Smith next spoke on the newly organized Ladies Auxiliary of Newark Branch and after some discussion and upon motion duly made and seconded it was

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voted that the Ladies should draw up By-Laws and that a clause be incorporated in the By-Laws to admit wives and daughters of members in good standing only. Mr. Smith next announced that a Jamboree was being arranged by the Convention Committee and that all the members and their wives would receive invitations to attend. The Affair will be held at the Moose Hall in Irvington on October 14th.

Mr. John Kotches, Chairman of the Publicity Committee, showed samples of certificates which he thought should be presented for some of the outstanding features at the Convention. Mr. Kotches was commended for his favorable suggestion, and it was voted that he complete this undertaking.

Mr. Paul Oldam then announced the names of all the speakers as scheduled beginning October 6th and ending May 30th, 1940. He stated that our first speaker was Mr. R. E. Petit of the Aluminum Company of America.

Meeting adjourned at 11:15 P. M.

NEWARK BRANCH EDUCATIONAL MEETINGS FOR 1939-1940

November 3, 1939—Dr. C. B. F. YOUNG, The Institute of Electrochemistry and Metallurgy; New York, N. Y.

SUBJECT:-The Proper Design of Racks and Shields for Electroplating.

November 17, 1939—W. A. HELBIG, Darco Corporation, New York, N. Y.

SUBJECT:-The Use of Activated Carbon.

December 1, 1939—CLARENCE W. SMITH, Philco Radio and Television Corp., Philadelphia, Penn.

SUBJECT:-Recent Developments in Bright Zinc Plating.

December 15, 1939—Joint Meeting with Newark Branch Ladies Auxiliary. Speaker:-GEORGE REUTER, American Can Company; Newark, N. J.

SUBJECT:-Round Table Discussion

January 5, 1940—PHILIP SIEVERING, Philip Sievering, Inc.; New York, N. Y.

SUBJECT:-Electroplating and its Progress.

January 19, 1940—L. ECKELMANN, Pyrene Mfg. Co.; Newark, N. J.

SUBJECT:-The Relation of Finish to Product.

February 2, 1940—S. L. LOPATA, The Duriron Company, Inc.; Dayton, Ohio.

SUBJECT:-Practical Aspects of External Heating and Filtration of Plating Solutions. (Illustrated)

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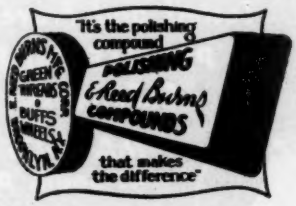

41 WITHERS STREET - BROOKLYN, N. Y.

February 16, 1940—A. P. MUNNING, Munning & Munning, Inc.; Newark, N. J.

SUBJECT:-The Dynamics of Polishing.

March, 1, 1940—WILLIAM J. SCHNEIDER, E. I. duPont, de Nemours & Co.; New York, N. Y.

SUBJECT:-"Moly-Black" The Dupont Process for Electrodeposition of Black Molybdenum Nickle Electro-Deposits.

March 15, 1940—PAUL A. OLDAM, E. Poeter & Company; Irvington, N. J.

SUBJECT:-The Effect of Base Metal Upon Color of Gold Electrodeposits.

April 5, 1940—LOUIS DUNROE, Pyrene Mfg. Company; Newark, N. J.

SUBJECT:-"Information Please".

April 19, 1940—H. LEROY BEAVER, The Abbot Ball Company; Hartford, Conn.

SUBJECT:-Barrel Finishing Methods.

May 3, 1940—E. C. RINKER, Oakite Products, Inc.; New York, N. Y.

SUBJECT:-Cleaning of Steel.

May 17, 1940—DR. K. SCHUMPELT, Baker & Company; Newark, N. J.

SUBJECT:-To be Announced.

June 7, 1940—GEORGE REUTER, American Can Co.: Newark, N. J.

SUBJECT:-Report of the Chemistry Class.

June 21, 1940—ROBERT SIZELOVE, Frederick Gumm Chemical Co.; Kearny, N. J.

SUBJECT:-Trouble Shooting.

GEORGE WAGNER, *Sec'y*

Boston Branch met Thursday Oct. 5th at the Bradford Hotel, Boston, Mass. at 8 P. M.

Minutes of the previous meeting read and approved, bills read and moved they be paid.

Communications read, one from the Research committee was turned over to the librarian for action the others were placed on file.

One application was read for the first time and turned over to the board of managers for approval, Leonard A. Chesworth, 58 Bow Street, Somerville, Mass., Associate.

Reports of Committees:

The banquet committee made its final report, the committee sent out to find a new meeting place reported that it had called on the Bradford Hotel to try and get better rates but were told

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that they couldn't do any better, so we went to see the manager of the Manger Hotel and we explained to him that we would be glad to return there if he could make better rates and we approved of the rates given, the report was accepted and the branch voted to return to the Manger next month.

The delegates to the convention made their report but as the members have received their Proceedings, the report will be read at one of our future meetings for discussion.

We had the Executive Secretary Mr. Kennedy with us and he suggested that Boston branch make a bid for the 1941 convention and that he would help along all he could to bring it to Boston. After a general discussion the branch voted to go after the 1941 convention at the next convention to be held at Dayton next year.

Mr. Kennedy asked the members to get together and read up a paper for the REVIEW, he also asked that the members interest the firms in and around Boston to advertise in the REVIEW, and to send any names that they may know to him and he will call on them.

One of the delegates to the last convention, Colgate Gilbert gave a little talk on the papers read there and it was interesting.

This opened the discussion for the evening. Mr. Kennedy had a question for the members — How to Silver plate Die-Castings. He asks this because he had a report from someone who was having trouble in plating them. It was suggested that the die-castings be brass plated first and then prepared for silver plating in the regular way.

If anyone knows of another way to do this I think Mr. Kennedy would be glad to hear from them. This ended the discussion and the meeting adjourned at 11 P. M.

All members please don't forget the next meeting of Boston branch will be held Thursday, November 2nd, at the Manger Hotel, Boston, at the North Station at 8 P. M.

A. W. GARRETT, *Secy.*

Springfield Branch. The Springfield Branch of the A.E.S. held its first meeting of the new year at the Hotel Charles on September 25th at 8:00 P. M. The meeting was called to order by President Costigan.

The minutes of the previous meeting were read and approved. The Secretary read a letter from Mr. A. B. Wilson, Chairman of the Research Committee requesting that each branch suggest subjects or problems which the Research Committee might investigate, the results of which will be of direct benefit to more of our members. These suggestions are to be in the hands of the Research Committee before October 13th. The following members were appointed to serve on this committee: Mr. Edward Dupuis, Chairman; Mr. William Curtis and Mr. Walter Barrus.

The secretary read a letter from Mr. R. Goodsell, our National President describing a contest which is open to all A.E.S. members. The member submitting the paper with the most merit and printed in the MONTHLY REVIEW during the coming year will receive a cash award of $50.00.

The Secretary then announced that the Springfield Branch had won the Huenerfauth cup for the best branch paper presented at the Milwaukee Convention, and explained that it would remain the property of the Springfield Branch until it is awarded to another branch. If a branch is awarded the cup for three consecutive years it remains the permanent property of that branch. Because the paper we presented at the Asbury Park Convention seemed to possess merit it

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Dr. Weisberg	Rapid Nickel Plating
Mr. F. F. Oplinger	Sodium Stannate Plating
Dr. Wm. Blum	Plating Specifications
Mr. G. B. Hogaboom	Some Overlooked Problems in Electroplating

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was suggested that the Springfield Branch prepare a paper for the coming convention to be held in Dayton with the mere possibility of winning the cup for a second and third consecutive year. Mr. Hartshorn was appointed to serve on that committee.

The speaker of the evening was Mr. Myron B. Diggin, Chief of Research of the Hanson-Van Winkle-Munning Co., of Matawan, N. J. He had chosen for his subject "Ductile Bright Nickel". Mr. Diggin explained which conditions of current density, solution composition etc., produced the most ductile deposits. He described the harmful effect of metallic and organic impurities. Mr. Diggin then described the advantages and uses of the new "9-H" semi-bright nickel solution which has just been developed by his company.

Mr. Diggin's talk was very interesting and instructive and taught us all many things we did not know about nickel solutions.

The meeting was adjourned at 10:00 P. M.

D. S. HARTSHORN, JR., *Sec'y.*

Detroit Branch meeting of October 6, 1939 Question Box.

Q. (a) What is a good cleaning procedure for die castings which must withstand baking at 250° for one hour after being plated with copper and nickel?

(b) What acid and what length of time of dip should be used?

A. A casting should first be degreased, then electrocleaned, finishing the electrocleaning with 10 to 15 seconds anodic cleaning. The casting should then be rinsed and immersed in 5% sulphuric or hydrofluoric acid until it gasses freely. It should then be rinsed and placed in the copper plating solution on a live work rod to prevent the deposition of copper by immersion.

One member stated that die castings should be cleaned and etched in such a manner that the appearance of the buffied surface was not seriously marred. In contrast to this, another member stated that he had very recently seen die castings cleaned and etched in such a manner that the casting was very black when it entered the copper plating solution and that these castings withstood baking at 300° for two hours.

It was pointed out that temperatures lower than 250F° could be used very satisfactory for baking and that if adhesion was a definite problem, the lower temperature would be helpful in decreasing rejects.

The subject of cleaning die castings anodically was discussed previously. For a more complete discussion of this, refer to the "Question Box" for September.

Q. Has anyone had any experience with flow-meters in connection with filter presses? Can they be purchased reasonably or can they be manufactured in the average shop?

A. One of the members pointed out that he had used a flow-meter successfully in connection with a filter press and found it to be quite helpful. They are too complicated to be manufactured in the shop. The manufacturer's name mentioned will be furnished on request by the librarian.

Q. What is the quickest way to remove a rubber coating from a plating rack?

A. For hard rubber coatings, trichlorethylene is recommended; for soft rubber coatings, cut with heated knife or soak in high flash naphtha.

Q. Is there any quick method for determining the pH of cleaning solutions and sodium nitrate solution which is accurate to 0.2 pH?

A. For electrocleaners, the glass electrode may be used. For sodium nitrate solutions, both pH papers and glass electrode are satisfactory. It

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should be pointed out that in measuring very high pH values with the glass electrode the sodium ion causes a serious error which must be allowed for by making certain corrections.

Q. What is the best etch to use on cadmium when plating nickel over buffed cadmium plate? How long should buffed cadmium be etched?

A. Inasmuch as this is not common practice, very little information was obtainable. One company is known to be using hydrochloric acid for this purpose but the strength of the solution and the time of etching are not known.

Q. Has any data been recorded on the effect of the "blue dip" on the adherence of electroplated silver to copper?

A. No such data had been recorded but the general opinion seemed to be that the use of a silver strike with a high free cyanide and low silver content would give better adhesion to copper than the use of the "blue dip".

Q. What methods, type of burnishing compound and materials should be used in burnishing stainless steel?

A. The most important factor is the use of hard stainless steel balls or pebs. Ordinary burnishing compounds can be used with this material to produce a very satisfactory job.

Q. Can silver be plated bright enough to require no buffing or just a light wipe on the buff?

A. No.

R. B. SALTONSTALL
Librarian-Detroit Branch

Buffalo Branch. The regular meeting of the Buffalo Branch was held at its new meeting place—the Bailey Bowling Academy.

It was decided that the next meeting be designated Toronto night and that a special invitation be sent to that branch requesting the pleasure of their company.

After a brief business session, the meeting was turned over to Mr. B. B. Case of the Hanson-Van Winkle Co., who gave his address on Cobalt Bright Nickel Plating. Mr. Case has that very desirable asset of being a practical plater as well as an expert on technical matters. He outlined the history of Nickel Plating and explained that the old time nickel plating was comparatively simple in contrast to present day requirements with its low pH, high current density, and high speed.

He emphasized the importance of filtration and cleanliness. Even with a new solution, the various salts cannot be pure without their costs being prohibitive and constant filtration and selective plating-out were the two most practical means of removing impurities. He had also used activated carbon and several other trade compounds with considerable success.

The guest speaker, Mr. Case then presented his views on what would be the ideal Nickel Plate. He admitted there was a great diversity of opinion on this subject but hoped with constant research, a plate would be evolved which would meet the demands of everyone.

The usual discussion followed with prolonged interest as is customary when a speaker such as Mr. Case, can impart such a thorough knowledge of his subject.

Mr. Case was given a hearty vote of thanks and the meeting adjourned at 11:30 after a very enjoyable and instructive evening.

RODERICK MCGHEE, *Secy.*

Pittsburgh Branch held its regular meeting Oct. 6th. We had a good attendance and a very interesting program. Due to the fact that our Librarian, Mr. Louis G. Marini Jr., has moved to York, Pa. and is unable to

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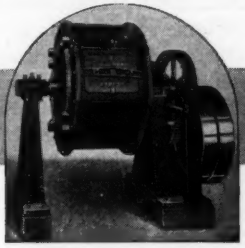

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attend many of our meetings, Mr. H. F. Saylor was appointed Librarian for the coming year. Mr. Matthew Drozd, Mr. John Corbit, and Mr. H. F. Saylor were elected to the Board of Managers for the ensuing year.

The following application for associate membership was received: Mr. J. Alexander McConaughy, Standard Steel Spring Co., Coraopolis, Pa.

We had two speakers for the evening, Mr. Freidl of the E. I. duPont de Nemours and Company who gave a talk on the "Electrodeposition of Black Molybdenum Finishes" and Mr. Richard A. Dimon of our Branch who presented a very interesting resumé of "Electrolytic Processes in the Making of Paper Money and Coins".

The first Fall inspection of the exposure racks in Pittsburgh was held Monday morning at 9:30 A. M. There were eight members of the Pittsburgh Branch and interested parties who inspected the samples with Dr. Wm. Blum. Although the samples have been exposed for only 16 months they have failed quite badly. These samples emphasized the problems that platers in the Pittsburgh district encounter.

F. R. KELLER, *Sec.*

Detroit Branch. The October meeting was held Friday night, Oct. 6th at Hotel Statler.

An invitation was received from the American Chemical Society to attend their meeting on October 17th, at Hotel Fort Shelby when Dr. G. E. F. Lundell, Chief Chemist of the Bureau of Standards will be the speaker.

The following applications were received and passed on to the Board of Managers for approval:-

Albert H. Clem, associate, Penna Salt Mfg. Co.; Lawrence Nagle, associate, Udylite Corp.; J. A. Raskin, associate, Udylite Corp.; Francis Reha, associate, Udylite Corp.

Five applications were elected to membership:-

Russell H. Mills, active, Universal Button Fastener & Button Co.; H. A. Holden Pray, associate, Battelle Memorial Institute.; R. A. Reicher, active, Holley Carburetor Corp.; Warner Remington, active, A. C. Spark Plug Division; Edward G. Turner, associate, Sydenham Trading Co. Ltd.

The speaker of the evening was Mr. F. C. Mesle, Oneida Ltd., Oneida, N. Y., and his subject "Plating and Testing Adherent Deposits". Highlights of his speech were that he had developed a method of evaluating the adherence of several kinds of deposits on steel, aluminum, stainless steel, nickel silver, copper, Britannia metal, brass and tin. That heating except in cases of poor adherence, will, in general improve adherence of electrodeposits. That adherence is better on smooth or highly buffed surfaces. The "Mesle Chord Method" of measuring electrodeposits was explained at the end of the talk, but after the meeting Mr. Mesle was kept busy explaining the finer points of his method.

Announcement was made of our next meeting on November 3rd when Mr. George Hogaboom, Hanson-Van Winkle-Munning Co., Matawan, N. J., will talk of "The Overlooked Problems of Electroplating". The Detroit Branch A. E. S. takes this means of inviting any members of other branches to this meeting.

Also the branch wishes to call attention to their annual Banquet and Educational Session which will be held at Hotel Statler on Saturday, December 9th.

W. W. WILSON, *Sec'y.*

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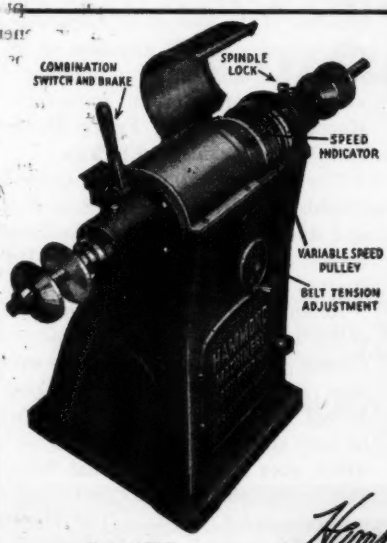

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Philadelphia Branch. The regular meeting of Philadelphia Branch was called to order by President J. E. Underwood at Lancaster, Pa. After the usual preliminaries Vice President Critchfield was invited to preside.

Mr. Critchfield informed the members that a class for platers will open at the McCaskey High School this fall in Lancaster.

Dr. A. K. Graham was introduced as the speaker of the evening and used as his topic, "Cyanide Spotting Out". There followed a most interesting discussion on this important subject.

First Vice President F. Fulforth gave a resumé of "Steel Fabrication" which was also well received. A rising vote of thanks was given to both speakers.

The Annual Educational Session and Banquet will be held at the Stephen Girard Hotel on Saturday, November 18, 1939. The committee of arrangements is as follows: Chairman, John L. Nelson; Tickets, George Gehling; Program, Warren A. Reynolds; Door Prizes, Ray Eckert; Educational Session, Dr. A. K. Graham.

Speakers: Dr. Louis Weisberg, Floyd Oplinger, Dr. Blum and George B. Hogaboom. (See full announcement in this issue of the REVIEW.)

A resolution was read and acted upon, and the secretary was instructed to send a copy to Executive Secretary, W. J. R. Kennedy for publication.

Application of William Moclock for active membership referred to the Board of Managers.

Research Committee Chairman, Al Hirsch was asked to communicate with Past President A. B. Wilson regarding the latter's research letter to the Branch.

"Cyanide" Bill Schneider will speak to the Branch at the October meeting. His subject will be "Black Molybdenum". Friday, October 27th will be observed also as Phil Uhl night in honor of Mr. Uhl who is the oldest member of Philadelphia Branch; a Charter member and Honorary member of the Supreme Society.

Al Hirsch reported that there are forty-two on the roster of the Mastbaum Vocational Training School Evening Classes. Philadelphia Branch now has two instructors in two cities teaching platers the fundamentals of plating chemistry.

After refreshments were served the meeting adjourned. There were eighty-two present at this meeting in Lancaster.

ROBERT E. JACKSON, JR., *Sec.*

Milwaukee Branch. At the invitation of our members who live in Racine, Milwaukee Branch was entertained in Racine Friday evening, October 6. The meeting was held in the building of the Wergeland Society, and was attended by 38 members of Milwaukee Branch and a number of visitors. Among them were Orville Kocour, Jacob Hay, Frank Hanlon, and Oscar Servis from Chicago.

The meeting was called to order by President Jack Geissman at 8:30 p. m., and in honor to Racine, immediately turned over the meeting to Vice-Pres. Rodney Olsen.

Arrangements have been made to continue our Chemistry Class this year. Classes will convene on Tuesday evenings at the Milwaukee Vocational School. The cost to Milwaukeeans will be very small; only two dollars, all of which goes to the Vocational School. Due to the School Board rules, students not residents of the city will be required to pay fifty cents per night more. Phil Ritzenthaler will teach again this year, and analysis of plating solutions will be stressed.

We will have a banquet early in the

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spring. Robert Steurnagel Sr., Harry Unke, Albert Hermansen, Frank Marx and Jack Geissman constitute the committee.

For next month, Librarian Henry Bornitzke has arranged for a speaker on "Polishing". This will be at our regular meeting place, the Colonial Room of the Republican Hotel.

After the meeting everyone was invited downstairs, and there a delicious lunch, which had been prepared by Mrs. Fred Hau, was served by Clarence Pouliot, Fred Hau, Leonard Beck and Rodney Olsen.

Milwaukee Branch takes this opportunity to thank the Racine Plating Co., Wisconsin Plating Co., Dumore Co., Oster Clipper Co., Shepard Plating Co., F. J. Green Engineering Co., and the Hamilton Beach Mfg. Co., for their assistance in making this affair possible.

DEXTER F. RHODES, *Sec.-Treas.*

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Rochester Branch. The Executive Board of the Rochester Branch held its regular monthly meeting on Friday night, Oct. 6. Communications read. No comments. Bills presented and ordered paid. Application of Mr. Louis J. Hept, 946 Maple St., Rochester, N. Y., for an active membership read and ordered published. The following were ordered suspended, Mr. Prescott A. Lyon----Mr. Clifford Wheeler----Mr. Wm. Siebert and Mr. Albert Benson. Local news was then discussed during which it was decided to hold an Annual meeting sometime in April 1940. It was decided to leave the selection of the definite date until a little later. After a little more discussion the meeting was adjourned.

JUDSON R. ELSTER, *Sec'y.*

St. Louis Branch. Regular meeting of St. Louis branch held Friday, Oct. 6th. After a hearty meal, at which 25 members were present, the meeting was called to order by President H. Lubker.

Roll call of officers showed three absent.

Minutes of previous meeting were read and approved.

Under order of applications of new members, five were received as follows: F. P. Holter, George B. Smith, A. P. Wrisberg, N. E. Robinson, associate members and John Donnelly active member. They were turned over to the Board of Managers to be acted on at the next meeting.

A letter was read from President Goodsell in regard to programs for coming year. St. Louis will do everything in its power to help the good work along.

A letter was also read from Chairman of Research Committee, A. B. Wilson.

E. J. Musick and J. Vogt made report of convention and all commented on the Exhibits. They were the best they had seen in a long time and that every branch had an exhibit.

Mr. Musick was again appointed Chairman of membership committee.

Next meeting will be held at Chandeysson Electric Co., where the talk will be about generators.

Nothing further, meeting was turned over to J. Vogt, Librarian. The exhibit board that was shown at the convention was on display. Each one in turn explained what the process was in plating as the articles plated were die cast, steel and brass cast.

It was a very interesting meeting.

C. T. MCGINLEY, *Sec'y.*

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New York, Philadelphia, Chicago, Detroit, Pittsburgh, Cincinnati, East Liverpool, Los Angeles, San Francisco

Works at Cleveland and Elyria, Ohio and Philadelphia, Pa.

Chicago Branch. The regular monthly meeting of the Chicago Branch was held on Oct. 14, 1939. President J. W. Hanlon presiding and all other officers present.

Communications read and acted upon by the Branch.

Application of Mr. G. W. Gilson accepted to membership.

Mr. O. E. Servis chairman of the research suggestion committee read the report of the committee, and after some discussion by the members to get a general idea of the Branch's suggestions in general he was authorized to make his report to Mr. Wilson.

Mr. H. A. Gilbertson, Chairman of the Banquet Committee reported that the Chicago Branch Banquet will be held at the Palmer House on Jan. 27, 1940.

The meeting was then turned over to the Librarian Mr. O. Wickmann who introduced Mr. J. Seifen who gave an interesting talk entitled "Polishing Room Cost". A rising vote of thanks was given to Mr. Seifen.

The following questions were found in the question box:

Q. Is there a dip that will brighten monel?

A. A good nickel strip will brighten monel.

Q. Can Moly-black be used in a plating barrel?

A. It is not practical as yet.

M. H. LONGFIELD, *Sec'y.*

Dear Mr. Kennedy:

The Chicago Branch takes this opportunity to express their appreciation for the new cover on the REVIEW. It has always been the favorite publication for the platers in this section of the country and the old "Face" puts it right back in the hearts of the members of Chicago Branch.

Yours truly

M. H. LONGFIELD, *Sec'y.*

Waterbury Branch. The regular monthly meeting was held on Friday, October 13th at the Hotel Elton. An informal dinner for members preceded the regular meeting. This was held at 6:30 and was well attended.

The meeting was called to order at 8:00 P. M. by President Candee, there being 60 in attendance. President Candee appointed Mr. Couch technical chairman and Mr. Couch introduced the speaker of the evening, Mr. Ralph McCahan of the duPont Co. The talk was on the new Molybdenum Black finished recently developed by the duPont Co. The talk was very practical in its nature and aroused keen interest on the part of those present. Mr. McCahan answered many questions on the properties of this new black finish.

Later in the evening Dr. George Dubpernell of the local branch gave a brief review of one of the new books of interest to the plating industry. This book, — "Protective Coatings on Metals", compares various types of coatings, electrolytic, organic and oxide and gives methods for testing their protective value.

The meeting adjourned at 10:30 P. M.

GEORGE MUSCIO, *Sec'y.*

THANKS TO PHIL RITZENTHALER

It is with deep appreciation that we convey to Mr. Philip Ritzenthaler of Cutler-Hammer Co. and a member of Milwaukee Branch our most sincere thanks for editing the 1939 Convention Proceedings. We are receiving congratulations from a great many persons to whom copies have been sent on the good work done by Mr. Ritzenthaler and Miss Marquardt.

W. J. R. KENNEDY

— ERRATA —

August 1939 Review "A Study of Silver Plating for Industrial Applications"

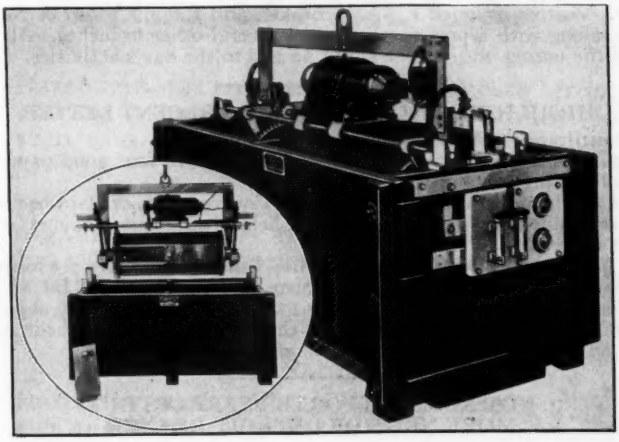
Page 612, line 6 should read: 0.0001 Page 599, line 17 should read: of Table V lists

Page 614, Item 5 should read: Silver cyanide (AgCN) 6.5 0.9 (0.8 t. oz./gal.)

" " 6 should read: Silver cyanide (AgCN) 35 4.7 (4.3 t. oz./gal.)

" " " 6 should read: Potassium carbonate (K_2CO_3)

MODERN HARD RUBBER CYLINDERS WITH MOTOR ATTACHED



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NEWARK BRANCH ANNUAL OUTING

On Saturday September 30, the Newark Branch held its annual outing at Vogel's Grove, Union, N. J. In spite of threatening weather in the morning, there was a good attendance. The outing committee, consisting of Horace Smith, George Wagner, Nelson Sievering, George Reuter, John Kotches, Sam Taylor and Paul Oldam, provided a bountiful spread.

Paul Oldam took charge of the games. There was a baseball game, horseshoe pitching, balloon races, foot races etc. Wives of the members were also present. Visitors included F. J. MacStoker, and Ralph Liguori of New York Branch, along with representatives from several other branches. All present enjoyed the outing until darkness put an end to the day's activities.

HIGHLIGHTS OF MR. CONLEY'S RECENT LETTER

Dayton Branch's plans for 1940 are well under way.

We will definitely limit the educational sessions to four good papers. Our plans call for preprints of each paper.

There will be no speeches by Governors, Congressmen, or ward heelers.

Walter Fraine is always on the job with helpful suggestions gained from long years of experience in the A.E.S.

Mrs. Conley and Mrs. Cochran with Miss Carey as secretary are formulating their plans with an enthusiastic committee. They learned a lot at Asbury Park this year, and are trying hard to make every woman glad she came to Dayton. All committee chairmen are on the job constantly, and believe that in making an early start their work will be made much easier.

HOT NOSED REPORTER FERRETS OUT MORE NEWS OF DETROIT BRANCH

Visitors were Mr. P. R. Lyons, Secretary of the Cleveland Branch, and Mr. Burton Daw of St. Louis Branch A.E.S. The reporter could also mention a visit from Floyd Oplinger, (Dupont copper expert), but his appearance is getting to be a habit which we hope he will continue. Floyd, who is taking no chances looked for a nice spot to make a landing at the annual Detroit Banquet and Educational Session.

The committee on the annual banquet and educational session announced the event to take place on Saturday, December 9th at Hotel Statler. There must be something "out of the ordinary" being hatched up as your reporter can't get within gun shot of a committee meeting to ferret out the news.

Some of the graduate students at M.S.C. in East Lansing, drive down to Detroit for meetings, and seem to enjoy them.

Our undercover men have learned that J. Wallingford Humphrey is really an alias for Charley Rezepka, the Duke of Bronson. Readers for this column will doubtless recall that J. Wallingford Humphrey was Jim Stewart's body guard at the Platers' picnic.

Relations between this country and Canada would be greatly improved and the Canadians would obtain a much better impression if some of the boys on this side would stay out of the picture when Canadian sportsmen are photographing their fish. This advice is addressed particularly to Mr. Rowley, of Mechanical Plating here in Detroit, who couldn't catch a clothes basket in a telephone booth.

This column welcomes Mr. Cecil Knight who comes to Detroit to take Mose Cherry's place as district manager for Hanson-Van Winkle-Munning.

Those boys you heard arguing at the last meeting, were Carl Heussner and Red Wilson, Subject: Who makes the better bumper bars?

Time: 1 hour.

Results. Nuts.

Walter Pinner, of General Spring Bumper returned home from a trip to California where he was given a movie test for the title role in a reissue of "Frankenstein".

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In the form of grease, oil, or traces of other organic impurities, these ghosts get into plating solutions unnoticed, and give no warning until they have caused damage through spoiled plating and lost production time.*

SUCH GHOSTS ARE EXPENSIVE

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Darco S-51, the grade for treatment of electroplating solutions, is packed in convenient 10-lb. and 50-lb. cartons ready for easy use. A card will bring the name of your nearest distributor by return mail.

*The article "Activated Carbons in Electroplating Solutions", discusses "ghosts in plating solutions" in detail. Copies are available upon request.

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The Abstract Section

FREDERICK FULFORTH, *Chairman, Program and Educational Committee*

Close Temperature Control in Chromium Plating. By M. H. GERHARD. *Metals and Alloys*, September, 1939, Page 280. The author stresses the importance of close temperature control in chromium plating baths by citing instances where a 2F lag in the operating temperature of the tank resulted in a spotted and uneven deposit which was hard to buff. The temperature at this particular bath was heated with steam coils and the temperature controlled with solenoid valves regulated by thermostats. This arrangement caused a temperature lag at 4F.

The problem was solved by the installation of electric lead covered immersion heaters which maintained the solution at 108 F. plus or minus 2F. After the installation of this unit it was found that the first month's savings in the handling and buffing of chromium plated automobile grilles was around $200 per month.

D. S. HARTSHORN, JR.

Corrosion of Zinc. By E. A. ANDERSON and M. H. FULLER. *Metals and Alloys*, September, 1939, page 282. The authors present a report of laboratory experiments and analysis of the corrosion products of zinc under various conditions of exposure and formation. X-ray diffraction methods and chemical analyses were used where the bulk was of sufficient size. Electron diffraction methods were also employed. W. L. Bragg and J. A. Darbyshire, in the absence of proof to the contrary, reported that the film on the surface of molten zinc was "pseudocubic form of zinc oxide". The authors found that a zinc oxide coating was formed on zinc immersed in water saturated with CO_2 free air, but that basic zinc carbonate was formed by the indoor atmospheric corrosion and water corrosion of zinc. The composition of the water corrosion product was found to be $4\ ZnO.CO_2.4\ H_2O$ and evidence obtained to indicate that the composition may vary depending upon conditions. Electron diffraction photograms of various zinc corrosion products are also shown.

D. S. HARTSHORN, JR.

Artificial Rubbers. TOPICS. *Machine Design*, Page 26, August 1939. American-made "buna" a new synthetic rubber is soon to appear on the American market in direct competition with natural rubber. Buna posseses all the characteristics of the natural product plus twice the resistance to abrasion, heat, oxididation, acids and alkalis. The material is the hydrocarbon butadien and has been made in Germany and Russia at an excessive cost because of the scarcity of raw materials. It will be manufactured by the Univerals Oil Products Co. from butane gas, a plentiful and cheap component of natural gas and refinery gas produced in gasoline cracking. The burane will be converted to butadien which will be polymerized and processed into synthetic rubber.

D. S. HARTSHORN, JR.

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3. **New Alloys.**
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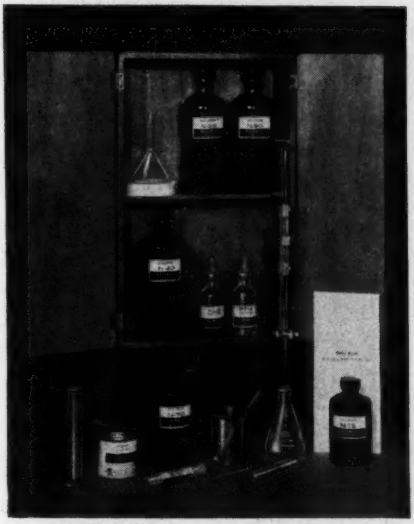

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Membership Report

To October 1, 1939

ELECTIONS

Byron H. Abedon, Crown Fastener Corp., 30 Cutler St., Providence, R. I.
Associate, Providence-Attleboro Branch

Howard M. Poole, Poole Silver Co., Taunton, Mass.
Active, Providence-Attleboro Branch

James F. O'Brien, Monocroft Products Inc., Providence, R. I. Active, Providence-Attleboro Branch

John F. Yeamans, Jr., Beardsley Hotel, Winsted, Conn.
Active, Hartford Branch

Albert V. Kassery, 31 Houston St., Bridgeport, Conn.
Associate, Bridgeport Branch

Thomas H. Wilber, The Bullard Co., Bridgeport, Conn.
Associate, Bridgeport Branch

Russell H. Mills, Universal Button Fastening & Button Co., 2250 W. Fort St., Detroit, Mich. Active, Detroit Branch

H. A. Holden Pray, Battelle Memorial Institute, 505 King Ave., Columbus, Ohio Associate, Detroit Branch

Alexander A. Reicher, 5606 Oregon, Detroit, Mich. Active, Detroit Branch

Warner Remington, 634 Moore St., Flint, Mich. Active, Detroit Branch

Edward G. Turner, c/o Sydenham Trading Co., Ltd., Wallaceburg, Ont. Associate, Detroit Branch

M. A. Snell, 19470 Laurel Ave., Cleveland, Ohio Associate, Toledo Branch

Roger W. Lindsay, Harshaw Chemical Co., 194 E. 97th St., Cleveland, Ohio Associate, Cleveland Branch

Geo. W. Gilson, Rival Mfg. Co., Kansas City, Mo. Active, Chicago Branch

V. A. Magnuson, 1111 Albers St., S. W., Grand Rapids, Mich.
Associate, Grand Rapids Branch

APPLICATIONS

M. Andrews, The Nella Enamelling & Electroplating Ltd., 21 Argo St., South Yarra, Melbourne, Australia Active, Los Angeles Branch

John E. Yarmack, 137 Varick St., New York City
Associate, Newark Branch

Carl C. Greiner, 468 East 34th St., Paterson, N. J.
Associate, Newark Branch

Stavin Pochna, Acme Mfg. Co., Stamford, Conn. Bridgeport Branch

John Deamico, Forsberg Mfg. Co., Bridgeport, Conn. Bridgeport Branch

H. L. Anderson, 806 Forest Ave., Jamestown, N. Y. Buffalo Branch

Christ Vargo, American Stove Co., 4901 Perkins Ave., Cleveland, Ohio Active, Cleveland Branch

Octavius Knight, 2 Rector St., New York, N. Y. Associate, Newark Branch

Leonard A. Chesworth, 58 Bow St., Somerville, Mass.
Associate, Boston Branch

Louis J. Hept, 946 Maple St., Rochester, N. Y. Active, Rochester Branch

REINSTATEMENTS

John Issenman, 5849 Boyer St., Montreal, Canada
Associate, Montreal Branch

Gus Bloxall, c/o Royal Yorke Hotel, Plating Dept., Toronto, Ontario, Canada Active, Montreal Branch

SUSPENSIONS

W. S. Goss, Arlington Rd., Whitemarsh, Penn. Philadelphia Branch

Gustav Fessenmeyer, Winslow Rd., Cleveland, Ohio Cleveland Branch

Prescott Lyon, Whittier Rd., Coldwater, N. Y. Rochester Branch

Albert Benson, 21 Main St., Whiteboro, N. Y. Rochester Branch